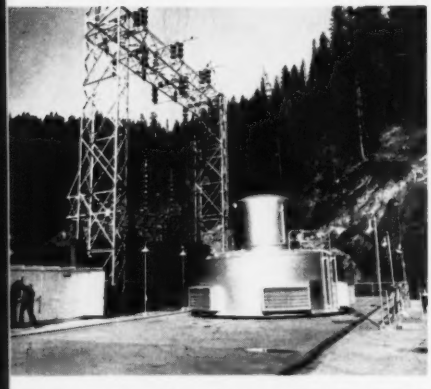
ELECTRICAL WEST

December 1953
25 Cents

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U.S.

Orchids to Atoms in Hawaii 101



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Good Restaurant Lighting Isn't Luck—Call a Lighting Decorator 92

When You Relight—Practice What You Preach 94

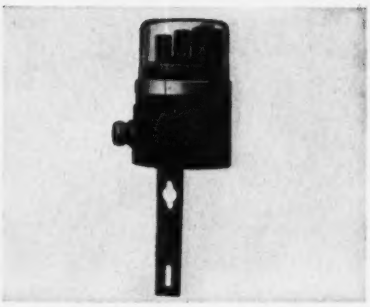
"bargain counter"

An electric meter may not look like the average homemaker's idea of a bargain counter, but that's what it actually is—a precision instrument for measuring the exact amount of electricity she uses. It is the counter over which today's biggest bargain—electricity—is sold.

These Edison newspaper advertisements tell the "lot of service for little money" story in terms of electrical appliance operation—and should be of interest, therefore, to everyone who sells appliances. Facts and figures on the biggest bargain in modern living make a good "closing chapter" for an appliance sales story, too.

SOUTHERN CALIFORNIA EDISON COMPANY

NEW CONTROL ELEMENT is used in the Type P Photoelectric Control and the Form 110 Luminaire shown at right. Its plug-in design permits convenient field servicing. New element is interchangeable with G-E photoelectric controls already in service.



TYPE P CONTROLS provide sensitive, low-cost, photoelectric control of series or multiple outdoor lighting circuits.

FORM 110 LUMINAIRE combines Type P control and standard optical systems in one compact unit for multiple circuits.

New G-E Photoelectric Street-lighting Controls

Provide reliable service longer, need less maintenance, cost less

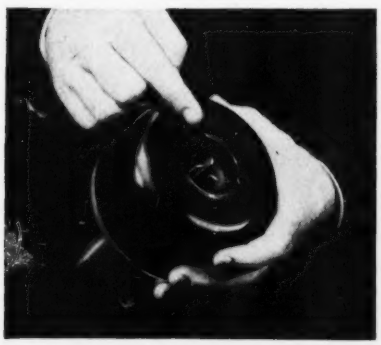
General Electric makes both separate photoelectric controls and complete photoelectric luminaires. Both now use an entirely new control element with an etched-circuit and dip-soldered connections. These new manufacturing techniques make possible a better, more accurate photoelectric control at a lower price.

G-E photoelectric controls give you light whenever its needed, regardless of the time of day. Power consumption is low, and the circuit design assures maximum tube life. The controls do not require adjustment while in service, and need no attention after power failures.

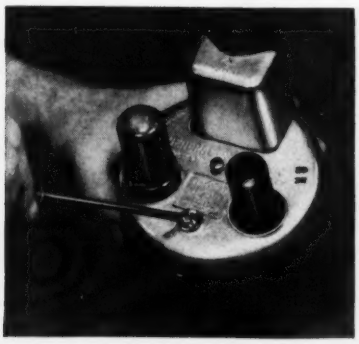
The new units are completely interchangeable with G-E photoelectric controls already in service. Enclosed in a standard glass meter cover for protection against physical damage, the control element plugs in, permitting replacement of the unit without reorientation.

For more information see your nearest G-E Apparatus Sales Office or Authorized Agent; or write for Bulletin GEA-5141 to *Section 452-136, General Electric Company, Schenectady 5, N. Y.*

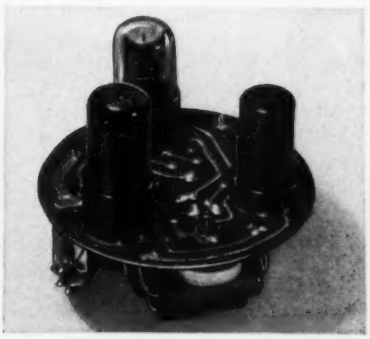
GENERAL ELECTRIC



ORIENTING GUIDES assure proper alignment of control element in receptacle, permit replacement without reorientation.



OPERATING LEVEL can be easily adjusted in field or shop by turning slotted screw accessible through protective casing.



ETCHED CIRCUITS and dip-soldering assure positive electrical connections and permit easy replacement of components.

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

DECEMBER 1953

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S.
The all-industry magazine of progress, established 1887, and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity." Contents copyright. Sixty-sixth year of publication

VOL. 111 NO. 6

ELECTRICAL WEST

George C. Tenney, Editor
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Peggy Boyer, Associate Editor
Walter C. Heston, Engineering Editor
John Cootz, Typography

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Next Month

No one seems to have come up with any sort of yardstick that would give an indication of the number of electrical engineers needed yearly to supply the industry's needs. **Electrical West** has what may be an original approach to the problem. A member of the staff will present results of a spot survey that should prove enlightening.

First generator at McNary Dam has gone on the line. We have arranged for an article by the Walla Walla District Army Engineer in charge of the development.

Interest continues high in microwave communication channels. One of the latest to be installed is that in connection with Ross power house of Seattle City Light. Features of this will be told.

Use of precast concrete slabs to form an oiltight enclosure for power plant oil storage tanks is a new idea. Such an installation will be described.

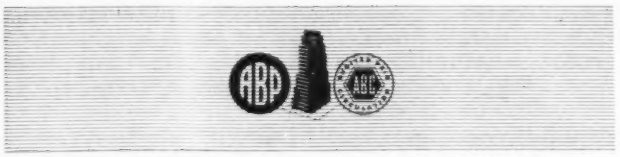
Another new idea is the use of fabricated square sheet steel columns for a substation structure. An Arizona job will be covered.

For those interested in lighting, wiring and commercial cooking, there will be an article on each dealing with outstanding installations.

Regular features will round out the issue.

ADVERTISING REPRESENTATIVES

Chicago (11).....Michael I. O'Connell, 520 N. Michigan Ave.
Los Angeles (17).....Carl Dysinger, 1111 Wilshire Blvd., MA 6-4323
New York (36).....Walter Klein, 330 W. 42nd St.
San Francisco (4).....Tom Carmody, Dick Alcorn, 68 Post St., DO 2-4600
Offices: Atlanta, Boston, Cleveland, Dallas, Detroit, Philadelphia, Pittsburgh, St. Louis



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1. Variac to control output voltage.
2. Range Switch transfers microammeter from 50 to 1000 microamperes range.
3. Guard Switch for by-passing stray currents to ground.
4. Neon Bulb protects against continuous overload.
5. Dual Range Microammeter measures leakage current.
6. Kilovoltmeter measures output voltage.
7. Calibration Curves translate microamperes into ohms resistance.
8. Power Switch (on-off control).
9. Grounding Post insures protection to operator.
10. Indicator Light (power on or off).
10
4
6
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7

L-M DC Insulation Tester, being used to check insulation on a Kyle Type H Recloser.

L-M's New DC Insulation Tester Assures More Positive Maintenance For Reclosers

New portable unit operates on 120 volts, 60 cycles; requires low input power; is easily handled by one man. Use of DC gives high degree of accuracy, tells relative strength of insulation, and avoids useless replacement of good insulation. Completely protected so the device cannot be damaged by a short circuit; can measure any part of a number of insulation paths, one stringer or an entire recloser. Costs only $375.

L-M's new DC Insulation Tester is a highly efficient, low-priced portable unit that provides accurate determination of the condition of insulation in reclosers or other apparatus.

With this tester you can greatly improve recloser maintenance. It avoids replacement of insulation that is still in good condition; and it indicates when insulation should be replaced so that a recloser with faulty insulation is not put back on the line.

It may be hooked up to test the complete apparatus, or just one stringer in the unit.

It measures the DC insulation resistance of the entire apparatus or any part, at test voltages from 1 KV to 15 KV DC. It operates instantly, there being no vacuum tubes requiring a warm-up period.

Leakage current is measured by a dual range microammeter with a 50 microampere and a 1000 microampere range.

One man can operate the unit. It weighs only 50 pounds, so that it is easily transported. Input power is low. The tester may be supplied from any 120-volt 60-cycle source.

Fully Protected

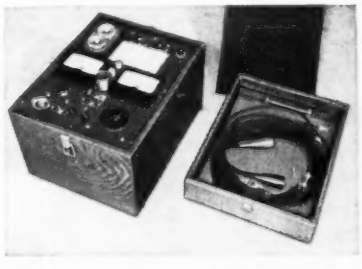
The microammeter is protected against sudden surges and protected against continuous overloads by a neon bulb that fires and by-passes the measuring circuit when an overcurrent occurs. Output current is limited in case of insulation failure by series resistors. The circuit high voltage components are protected against accidental over-voltages by an adjustable gap which discharges the output capacitor through a resistor.

Economical

The L-M DC Insulation Tester costs only $375.00. It takes out the guesswork and assures more positive recloser maintenance. A few moments' time can prevent hours of additional apparatus replacement, and the timely replacement of a faulty piece of insulation may prevent serious damage or complete destruction of valuable apparatus.

Get Complete Information

Ask the L-M Field Engineer for the new bulletin on the L-M Insulation Tester—or get a demonstration. Or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).



The L-M Insulation Tester is completely self-contained. Cover holds all leads, power cord, and instruction book. The whole unit weighs only 50 pounds.

155-R

LINE MATERIAL

Kyle Reclosers

"A shipyard is a graveyard we need top quality

says INGALLS SHIPBUILDING COMPANY,
world-famous shipbuilder, Pascagoula, Mississippi

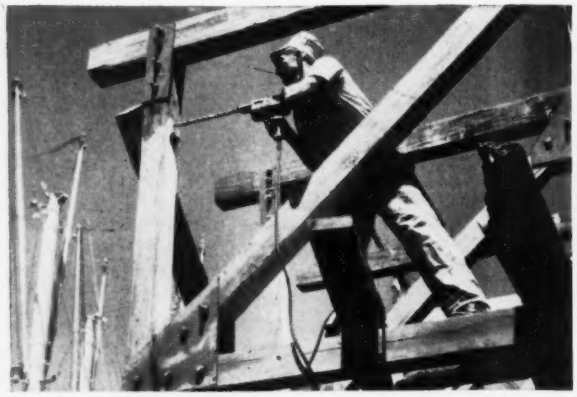
At this vast shipyard, Ingalls has 1200 welding machines, and 1000 welders to man them. The Amerclad Welding Cable is run at top amperage 16 to 24 hours a day. It is dragged over razor-edged steel scrap and battered under heavy loads. It comes into contact with fresh welds while they are still red hot, and it is constantly showered with flaming slag from the burners' torches.

Mr. C. A. Guynn is the Master Mechanic at Ingalls in charge of all maintenance and service. He says this: "We're an all-welded shipbuilder, and we can't stand lost production time due to faulty cable. Our cable has to withstand heat and abuse, and it has to be *flexible*. An extra-flexible cable like Amerclad is easy on the welder's wrists, and it lasts *twice* as long as cables that lack this feature."

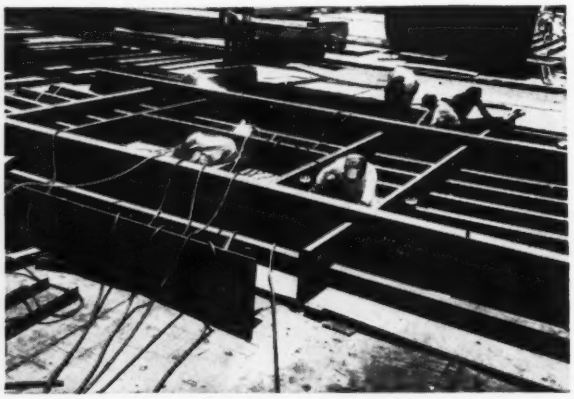
This great shipyard uses 60,000 feet of welding cable a year. But whether you use 60,000 feet or 600; whether you need a rugged cable for welding machines, power shovels or electric hand drills—there's a tough Amerclad design to give you the very best service life.

Send the coupon for more information about U·S·S Amerclad.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL CORPORATION, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



Ingalls uses lots of Amerclad for portable power tools. Here, it powers a half-inch electric drill used to bore 6-inch shoring timbers.



This is a typical shipyard operating condition. The cable is exposed to all kinds of weather, and dragged over sharp steel plates and beams.

A STANDARD CABLE FOR

▼ asbestos wire and cable ▼ shovel & dredge cable
▼ paper & varnished cambric cable
▼ aerial, underground & submarine cable

AMERICAN STEEL & WIRE DIVISION — USS — AMERICAN ELECTRICAL WIRE AND CABLE — UNITED STATES STEEL

U·S·S AMERICAN ELECTRICAL

for poor cable— products like Amerclad"

EVERY SPECIAL JOB

▼ mold cured portable cord
▼ machine tool & building wire
▼ special purpose wire & cable

WIRE & CABLE

USS

SEND THE COUPON

American Steel & Wire
Room JE-123, Rockefeller Building
Cleveland 13, Ohio

☐ Please give me more information about Amerclad.
☐ I'd like to talk to your representative.

Name .....

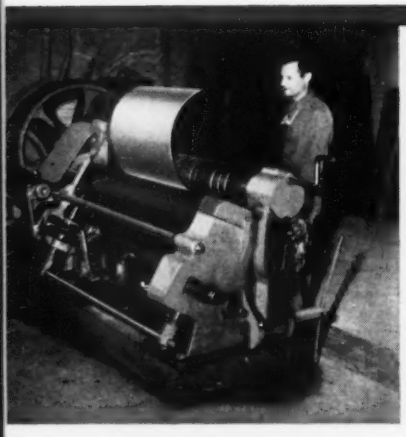
Firm .....

Address .....

City ..... State .....

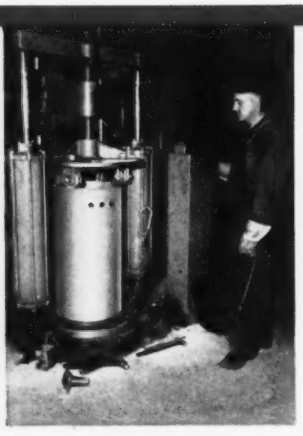
UNITED STATES STEEL

This is how *Kuhlman* makes distribution transformer tanks

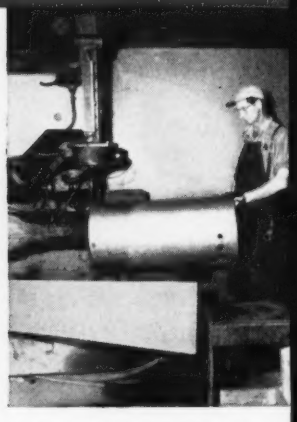


1. All Kuhlman transformer tanks are made of heavy gauge copper bearing steel. Here a tank begins to take shape. The steel has been measured and cut and the necessary openings made. It is now being rolled into the shape of a cylinder.

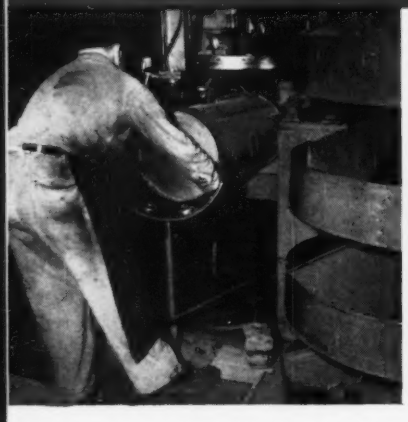
2. After the metal has been shaped, the edges are brought together and electrically welded to form an oil tight seam.



3. Next, the top end is "rolled down" to a smooth lip to form a suitable gasket seat.

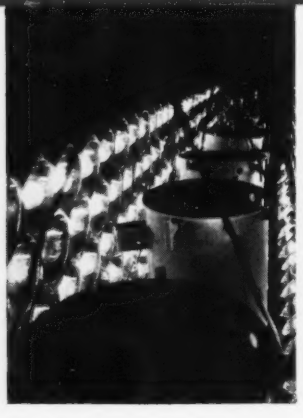


4. The next step is to attach the bottom. This is first "spotted" and then electrically welded all the way around to form an oil tight seal.

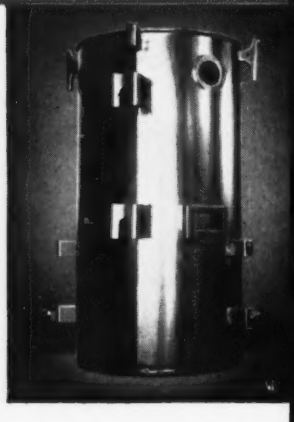


5. After the bottom end has been "rolled down" to form a smooth lip, the necessary accessories such as lifting ears, nameplate bracket, and mounting brackets are spot welded onto the tank as shown above.

6. Before they are painted the tanks are chemically cleaned and then shot blasted to assure a clean painting surface. Each tank receives a coat of rust inhibiting primer and two coats of corrosion resistant paint.



7. After each coat of paint the tanks are "baked" with infrared lights to insure a more durable finish.



8. And here is a completed tank, ready to receive its core and coil assembly and all necessary connections. Surfaces of Kuhlman tanks have successfully withstood 500 hours of salt spray and weatherometer tests.

Kuhlman transformers have been "on the line" for over half a century. Many of the earliest Kuhlman transformers are still in service—proof that Kuhlman builds rugged, highly efficient transformers. Specify Kuhlman. For more details about distribution transformers, ask for Bulletins CS-201 and CS-202.

Kuhlman **ELECTRIC COMPANY, BAY CITY, MICHIGAN**
CRYSTAL SPRINGS, MISSISSIPPI

KUHLMAN K E ELECTRIC

EXPORT REPRESENTATIVES: *International Standard Electric Corporation,*
15th Floor, 50 Church Street, New York 7, New York. Cable address: Microphone, New York.

ELECTRICAL INSULATION IS OUR SPECIALTY

Q. *What ONE wire and cable producer grows its own natural rubber, and makes its own synthetic rubber?*

A. UNITED STATES RUBBER COMPANY.

Q. *What ONE wire and cable producer makes plastics?*

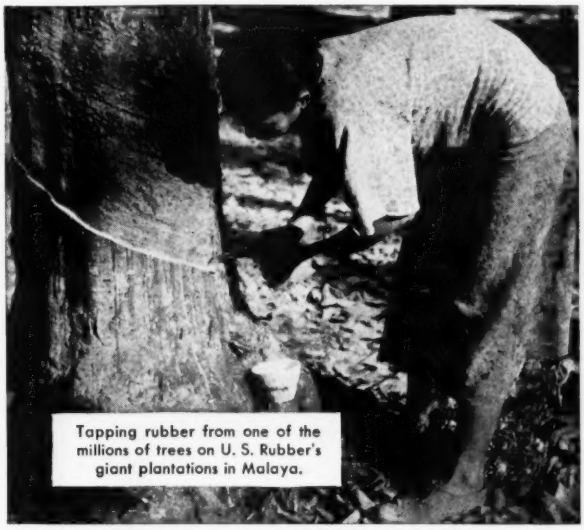
A. "U. S."

Q. *What is the most important part of wire and cable?*

A. The insulation.

Q. *Who is best equipped to make wire and cable with superior insulation?*

A. U. S. RUBBER—which grows its own natural rubber, makes its own synthetic rubber, manufactures its own plastics.



Tapping rubber from one of the millions of trees on U. S. Rubber's giant plantations in Malaya.

Isn't it logical that a rubber company should make the best wire and cable insulation there is? U. S. Rubber has been a pioneer in insulation for over 70 years—has amassed in that time a stockpile of research data and experience that can't be beat. Electrical insulation is a "U. S." specialty!

Electrical insulation makes the difference between superior and ordinary wire and cable. Conductors of all manufacturers are standard, but insulation must be the best that science can produce. That's why your best bet in wire and cable is U. S. Rubber.

SOME MORE OF THE MANY DIFFERENT VARIETIES OF "U. S." WIRE AND CABLE

UTILITIES: Power Cables • Street Lighting • Royal Cords • Network Cables • Utility Control • Pole & Bracket Cable • Service Entrance • Weatherproof • Zip Cord Pole Fixture Cable • Sup. Control

RAILROADS: Power Cables • Communications • Railway Signal • Royal Cords • Welding Cable • Railway Utility • Sup. Control • Weatherproof

HEAVY INDUSTRY: Power Cable • Royal Cords • Welding Cables • Control Cables • Machine Tool Wire • Building Wire • Switchboard Wire • Thermostat Cable • Bus Drop Cable

Absolute Tops in OZONE MOISTURE HEAT Resistance

U. S. RUBBER'S BUTYL-INSULATED POWER CABLES

These cables are for use on power distribution, street lighting and station control circuits and for general-purpose wiring on circuits up to 8000 volts between phases and at conductor temperatures up to 80 C. The insulation will not crack after four hours in air containing 0.015 per cent ozone. They are light in weight, easy to install and join, and are resistant to oil, heat, sunlight, flame, acids, alkalies and corrosive chemicals. The following are guaranteed test values:

PHYSICAL AND AGING PROPERTIES (MINIMUM VALUES)

	Butyl Insulation			Neoprene Jacket	
	Unaged	After 168 Hrs. in O.B. at 80 C.	After 7 days in Air Oven at 250 F.	Unaged	After 96 Hrs. in O.B. at 70 C.
Tensile, lbs. per sq. in.	600	500	400	1800	1600
Elongation, per cent	400	350	350	300	250

MOISTURE RESISTANCE (MAXIMUM VALUES)

a. Dielectric constant and power factor of insulation after immersion in water at 50 C.

Dielectric constant, one day	4.0
Per cent gain, 1 to 14 days	2.0
Per cent gain, 7 to 14 days	1.0
Power factor, one day, per cent	2.0

b. Mgs. per sq. in., 7 days at 70 C. 15.0

U.S.RUBBER
SERVING THROUGH SCIENCE

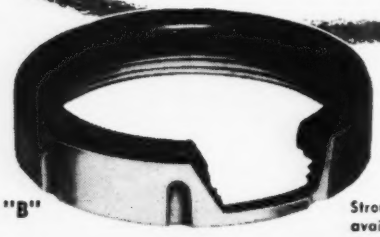
UNITED STATES RUBBER COMPANY

ELECTRICAL WIRE & CABLE DEPT. • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

THERE'S AN

O.Z. BUSHING

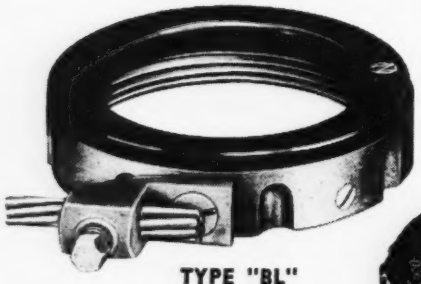
FOR EVERY JOB



TYPE "B"

Strongest insulating bushing available! Exclusive design permanently locks insulation into casting.

Finest, high-strength, all-Bakelite insulating bushing. A top quality bushing—competitively priced!



TYPE "BL"

Same as proven Type "B" with lug for quick, positive ground connections. Set screw in casting facilitates positioning.

TYPE "A"

All-Bakelite bushing with male thread for insulation of exposed cables passing through holes in metal boxes or troughs.

TYPE "BB"

Over 35 years of specialized experience in the design and manufacture of conduit fittings is behind the complete line of O.Z. insulating bushings. Whatever your insulating bushing problem, you can be sure there is an O.Z. design to fit your application perfectly. Buy O.Z. bushings from your local electrical distributor.

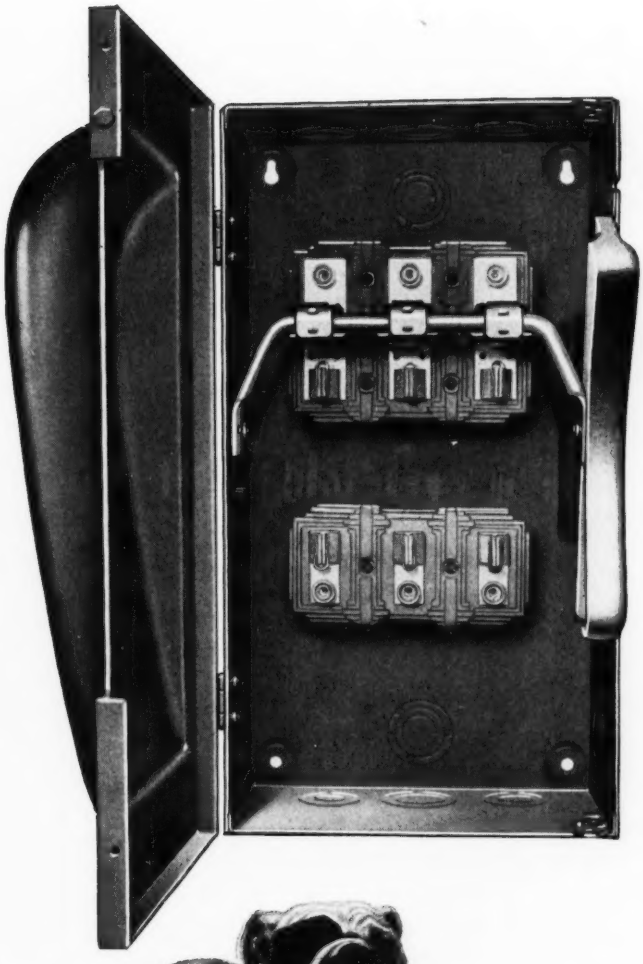
O.Z. ELECTRICAL MANUFACTURING CO., INC.

262 BOND ST. • BROOKLYN 2, N. Y.

CAST IRON BOXES • SOLDERLESS CONNECTORS
CABLE TERMINATORS • GROUNDING DEVICES
POWER CONNECTORS • CONDUIT FITTINGS

Representatives in all principal cities

BULLDOG VACU-BREAK SAFETY SWITCHES



wide open wiring spaces

Extra-large wiring gutters are but one of the many thoroughbred features which make BullDog Vacu-Break Safety Switches easier and cheaper to install and maintain.

BullDog's silvered wire grips—cold-forged from pure copper for maximum strength and conductivity—help make wiring in these roomy gutters a snap . . . save valuable time.

Unequalled protection is yours, too, with BullDog switches because BullDog's exclusive Vacu-Break Arcing Chamber smothers dangerous arcs before they can damage or heat up the contacts. And patented Clampmatic contacts mean bolt-tight contact connections . . . give you a smoother operating, cooler switch.

BullDog's simplified line of Vacu-Break safety switches handles all requirements. Write today for free Bulletin SS-250 containing complete information. BullDog Electric Products Company, Dept. EW 123. Detroit 32, Michigan.

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THOROUGHBRED IN ELECTRICAL EQUIPMENT

BULLDOG
ELECTRIC PRODUCTS COMPANY

CONSULT THE FOLLOWING PACIFIC COAST REPRESENTATIVES

Coast Electric & Manufacturing Company
1733 N. E. Seventh Ave.—Tel. TUxedo 5191
Portland 12, Oregon

Safety Switchboard Company
910-89th Ave.—Tel. LOckhaven 9-7001
Oakland 21, California

BullDog Electric Products of Los Angeles
2885 E. Washington Blvd.—Tel. ANgelus 9-8101
Los Angeles 23, California

Young Electric & Manufacturing Company
2134 Curtis Street—Tel. AComa 4841
Denver 2, Colorado

POWER . . .

MOLONEY ELECTRIC = { BETTER PERFORMANCE
GREATER RELIABILITY
LESS MAINTENANCE

FACTORIES AT ST. LOUIS 20, MISSOURI

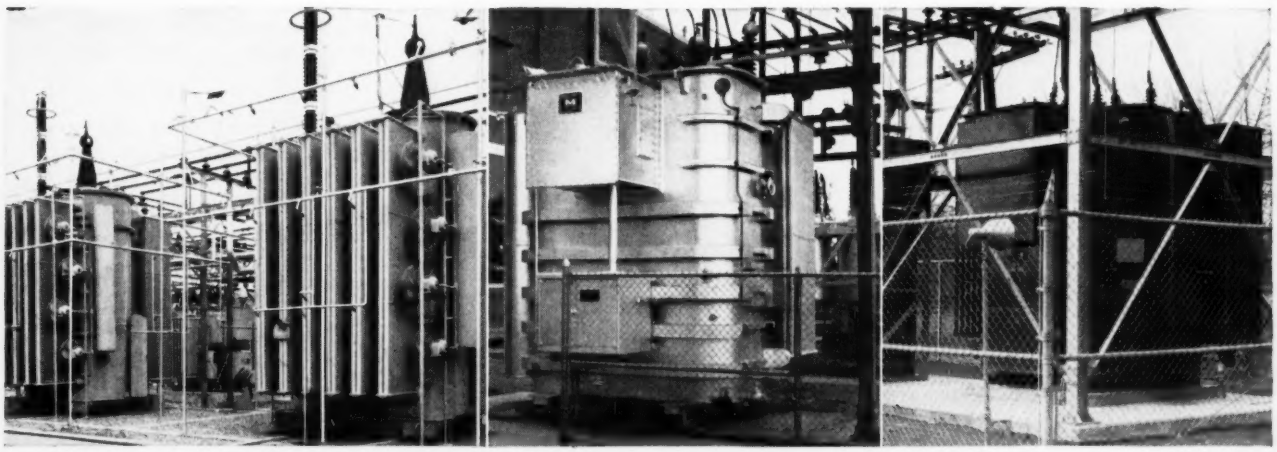
MOLONEY ELECTRIC

The MAINSPRING of INDUSTRY

Modern industry requires a power source as dependable as the mainspring of a fine watch—central station electric power. But just as the accuracy of any watch depends as much upon jewelled bearings and gears that transmit the energy of its spring, your electrical system's dependability relies heavily upon the equipment which transforms and regulates the flow of power.

Moloney's famous greater "margin of safety" will give your system clock-like dependability . . . this means that Moloney Power Transformers stay on the job continuously and efficiently. The engineering, design and fabrication superiority that has been the mark of Moloney for 57 years results in transformers that perform better, with greater reliability and have longer operating life. Consider all the advantages that Moloney offers . . . and you'll install Moloney *all along the line.*

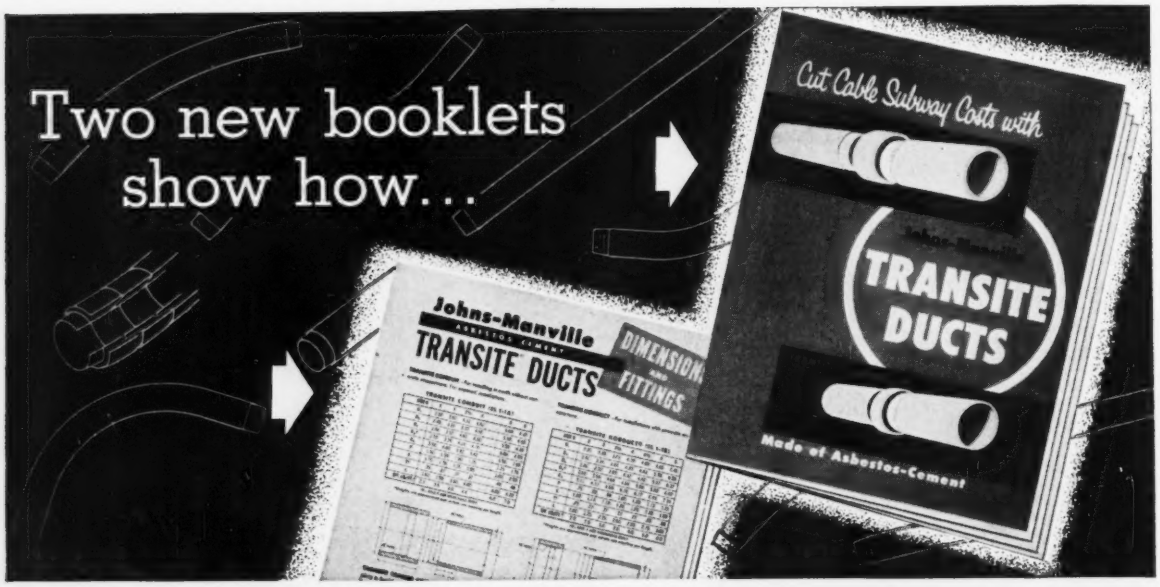
ME53-41



MOLONEY ELECTRIC COMPANY

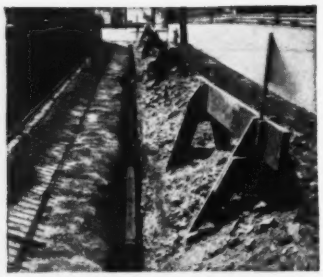
Manufacturers of Power Transformers • Distribution Transformers • Load Ratio Control Transformers • Step Voltage Regulators • Unit Substations

AND TORONTO, ONT., CANADA • SALES OFFICES IN ALL PRINCIPAL CITIES

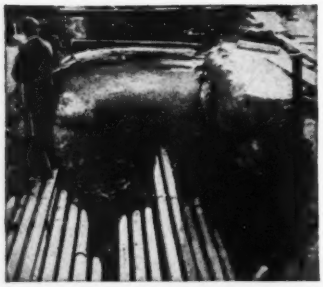


Transite® Ducts cut cable subway costs—

give greater cable protection



Transite Conduit is the thicker walled duct which is used for exposed work or is laid directly in earth without a concrete encasement. Saves time, labor and materials on the job



Transite Korduct® is the thinner walled duct for installation in concrete. Inasmuch as it is used principally for hi-voltage lines, its high thermal conductivity reduces operating losses

● Johns-Manville presents these brochures as a service to public utilities, design engineers, and all other users and planners of cable subway systems. "*Transite Ducts*" shows how improved cable subway protection, installation, maintenance and operational savings may be achieved. "*Transite Ducts, Dimensions and Fittings*" give the necessary dimensional data on all ducts and fittings.

Transite Ducts offer improved cable subway protection. Made of asbestos and cement, Transite cannot burn, smoke, fume or generate explosive gases. Transite confines arc damage and protects adjacent cables against heat and flame. Transite resists corrosive action of soils; is unaffected by electrolysis.

Installation savings result because Transite is strong, light in weight, easy to handle. It comes in long, 10-foot sections, thus, fewer joints are required. Its permanently smooth bore prevents injury to cable either from natural movement or when pulling cable through. Maintenance savings result from the permanent nature of the asbestos cement composition of Transite. It is as durable as stone.

Moreover, operational savings result because cables run cooler due to the high thermal conductivity of Transite Ducts. This also results in prolonged cable insulation life.

For complete details on how Transite Ducts can cut cable subway costs for your system, send for copies of "Transite Ducts," EL-29A and "Dimensions and Fittings," EL-45A. Write to Johns-Manville, Box 60, New York 16, New York. In Canada, 199 Bay Street, Toronto 1, Ontario.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville TRANSITE DUCTS

TRANSITE KORDUCT—for installation in concrete

TRANSITE CONDUIT—for exposed work and installation underground without a concrete encasement

Here's the Current Transformer You've Been Asking For!

New MOLDED CURRENT TRANSFORMERS

for 600-Volt Indoor or Outdoor Service

Maintenance Eliminated! This new "thru-type" current transformer is molded in thermo-setting resin. There is nothing to deteriorate . . . plastic never requires painting. Only secondary terminal studs and base mounting studs project through the plastic — a perfect seal is established at these points, thanks to the high adhering properties of the plastic. The projections are threaded and non-corrodible. You get excellent resistance to weathering.

Installation Simplified! The transformer is small and compact. Installation time is reduced because there are no bolted connections — a feature of "thru-type" design. Future changes caused by load growth are simplified too. An elliptically shaped window (1⅜ by 2¾ inches) has plenty of room for two 500 MCM conductors with 600-volt insulation.

Secondary terminals are on top of the transformer to permit closer mounting . . . you can connect secondary leads from either side. The secondary terminals are protected by a weather-resistant sealable cover. You can substitute a condulet box if desired.

A-4181

4 Ratings — Current ratings available in type TWM with line conductor passing once through the primary window are: 200 to 5, 400 to 5, 600 to 5, and 800 to 5. Intermediate ratings may be obtained by looping the primary conductor through the window two or more times.

Type TWM transformers have conventional accuracy for light burden metering. The 200-amp rating has ASA accuracy classification of 0.3 with burden B-0.1 and 0.6 with burden B-0.2. The 400, 600, and 800-amp ratings have 0.3 accuracy at burdens of B-0.1 and B-0.2.

For complete information, call your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

ROOM FOR 5 MORE

CONDUCTORS

WHEN IT'S

ROCKBESTOS PNR

CONTROL CABLE

Both conduits are 1¼" D. But the one on the left carries 12-conductor PNR #9 AWG — 5 more conductors than the conventional 7-conductor #9 AWG cable below.

That's because Rockbestos PNR is 46%* smaller in area. A better insulated control cable that saves you steel conduit, fittings and labor. Write for the full PNR story.

*Average determined by comparison with competitive control cable.

ROCKBESTOS

PRODUCTS CORPORATION

NEW HAVEN 4, CONNECTICUT

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Quick facts about

PNR

46% smaller area* . . . 28% smaller diameters*. Use smaller conduit and fittings, or put more conductors in present conduit.

Dielectric breakdown . . . over 40 times operating voltage.

Lighter and smaller. Easier to handle, store, ship, pull through conduit.

Flexible to —25°C (—13°F). No cracking!

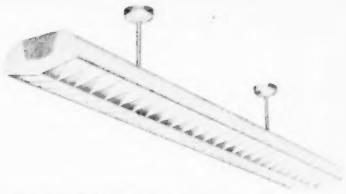
Rated 600 volts . . . conductor operating temperature 75°C (167°F).

all under one roof

CIRCL-LITE CX-1000-S

SCHOOLS

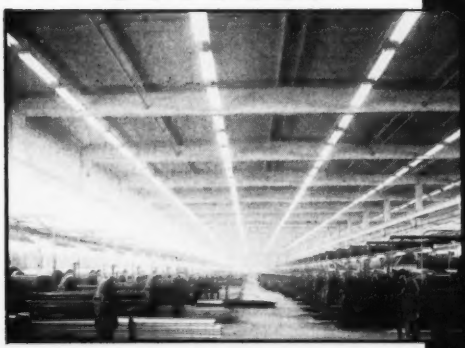
This concentric ring indirect fixture designed for low ring brightness and high efficiency. Open rings prevent dirt or dust accumulation. Deluxe non-turn hanger and bowl supports approved EARTHQUAKE PROOF.



COLLEGIATE PM-284

OFFICES

Engineered for simplified installation and efficient illumination. The smartly designed luminaire is ideal for offices where a critical seeing job is required. Mounting—continuous or individual—ceiling or pendant.



NE-2661

FACTORIES

Ever-popular open end fluorescent. This fixture, with its porcelain enameled reflector will not be damaged by abrasive dust or oily vapor and naturally carries the RLM label.

MASTER

OUTDOORS

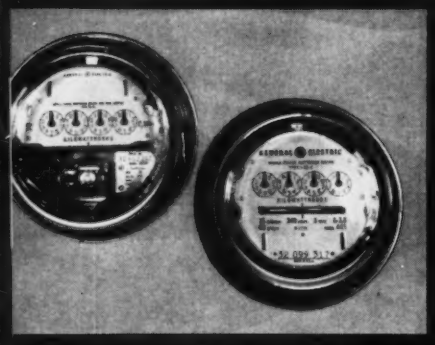
For uniform distribution of light over large areas. Inner reflector for high-lighting. Porcelain enamel finish with gray or white exterior.

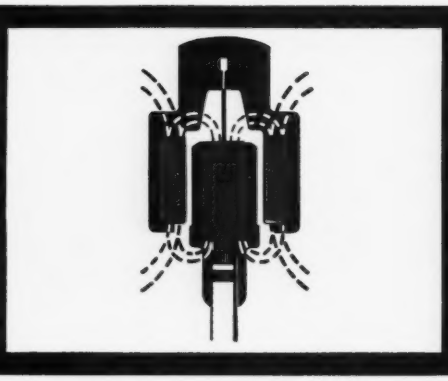
SMOOT-HOLMAN

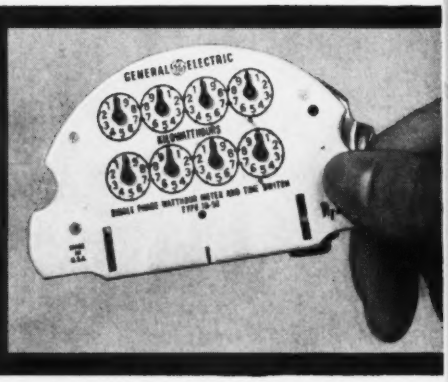
HOLLYWOOD CALIFORNIA

Another new member of the I-50 family

7 REASONS WHY THIS NEW G-E METER* WILL LOWER YOUR METERING COSTS



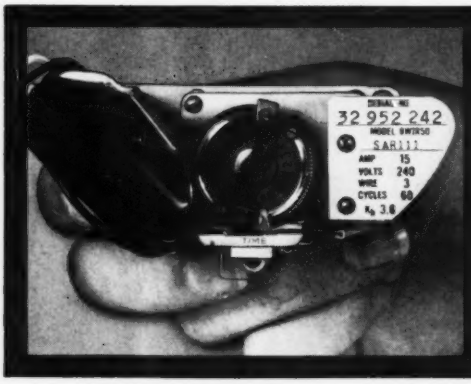


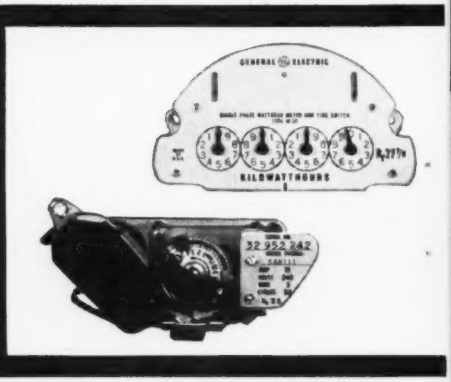


1 **NEW TYPE IR-50** for off-peak control incorporates the many features of the G-E I-50 meter to bring you greater dependability and accuracy.

2 **MAGNETIC SUSPENSION SYSTEM,** identical to the I-50 watthour meter's "floating disc," eliminates bearing wear and thus keeps maintenance costs to a minimum.

3 **NEWLY REDESIGNED REGISTER,** either single or double rate, has maximum legibility and accuracy. Resetting is simplified with individual plungers.





4 **IMPROVED TIME SWITCH** mechanism in new IR-50 incorporates 40-ampere silver contacts and Type SG-2 timing motor with the time-proven Telechron** rotor for longer life.

5 **TIME SWITCH AND WATTHOUR REGISTER** are separate assemblies and can be removed from meter independently, making maintenance easier.

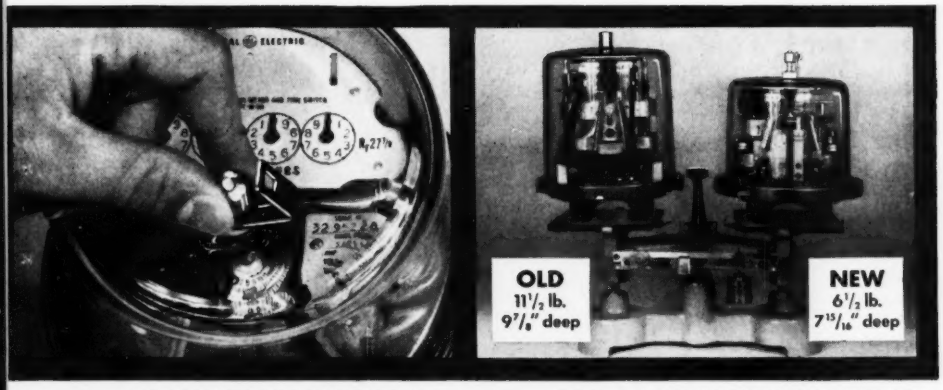
***THE GENERAL ELECTRIC IR-50 COMBINATION WATTHOUR METER AND TIME SWITCH** is the newest member of the I-50 family. For a sample demonstration, or for more information, contact your nearest G-E representative or write: Section 601-100, General Electric, Schenectady 5, N. Y.

**Reg. Trade-mark of General Electric Company.

NEW

General Electric Type IR-50 combination watthour meter and time switch

NEWEST MEMBER of the General Electric I-50 family, the IR-50 meter registers and controls off-peak water-heater loads. Proven I-50 meter features such as stability of calibration, inherent accuracy, co-ordinated insulation, surge protection mean lower operating costs.



6 **NO SCREWDRIVER IS NEEDED** for setting time dial on IR-50. External reset knob, which can be easily sealed or locked, facilitates setting.

7 **COMPLETELY NEW DESIGN** of the G-E IR-50 meter, ⅓ smaller, and little more than half the weight of older types, means lower handling costs and faster, easier installation.

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

SHOPPING FOR BETTER LIGHTING VALUES?

When considering lighting, you certainly want ...al effective illumination at the most reasonable cost. You also expect the lighting equipment to be thoroughly engineered, photometrically designed and of quality construction. You probably ...found from experience that Sunbeam lighting equipment turns out to be the better value. Your "First Awards" in 1953 for lighting installations ...specifying Sunbeam luminaires should prove that you are right.

Shown below is a modular installation of Sunbeam's highly efficient L1784.96 units in Walker's ...partment store, Long Beach, California. Value-wise shoppers may not know that maximum utilization from existing wiring ...allowed in this installation, but you may be assured that these ..., shallow fixtures (which may ...mounted in various geometric patterns) ...are a real ...

Utility saves with "Scotch" Plastic Tape

"Scotch" 33 Plastic Electrical Tape saves three ways at the power plant of a large utility in New England.

First, it *saves application time* since only one tape is needed for mechanical and electrical protection. And "Scotch" 33 conforms smoothly to odd-shaped surfaces, sticks tight with only slight finger pressure.

Second, it *saves space* since it's only 7 mils thick. Yet "Scotch" No. 33 has a dielectric strength of 10,000 volts per layer. Gives neat, compact results.

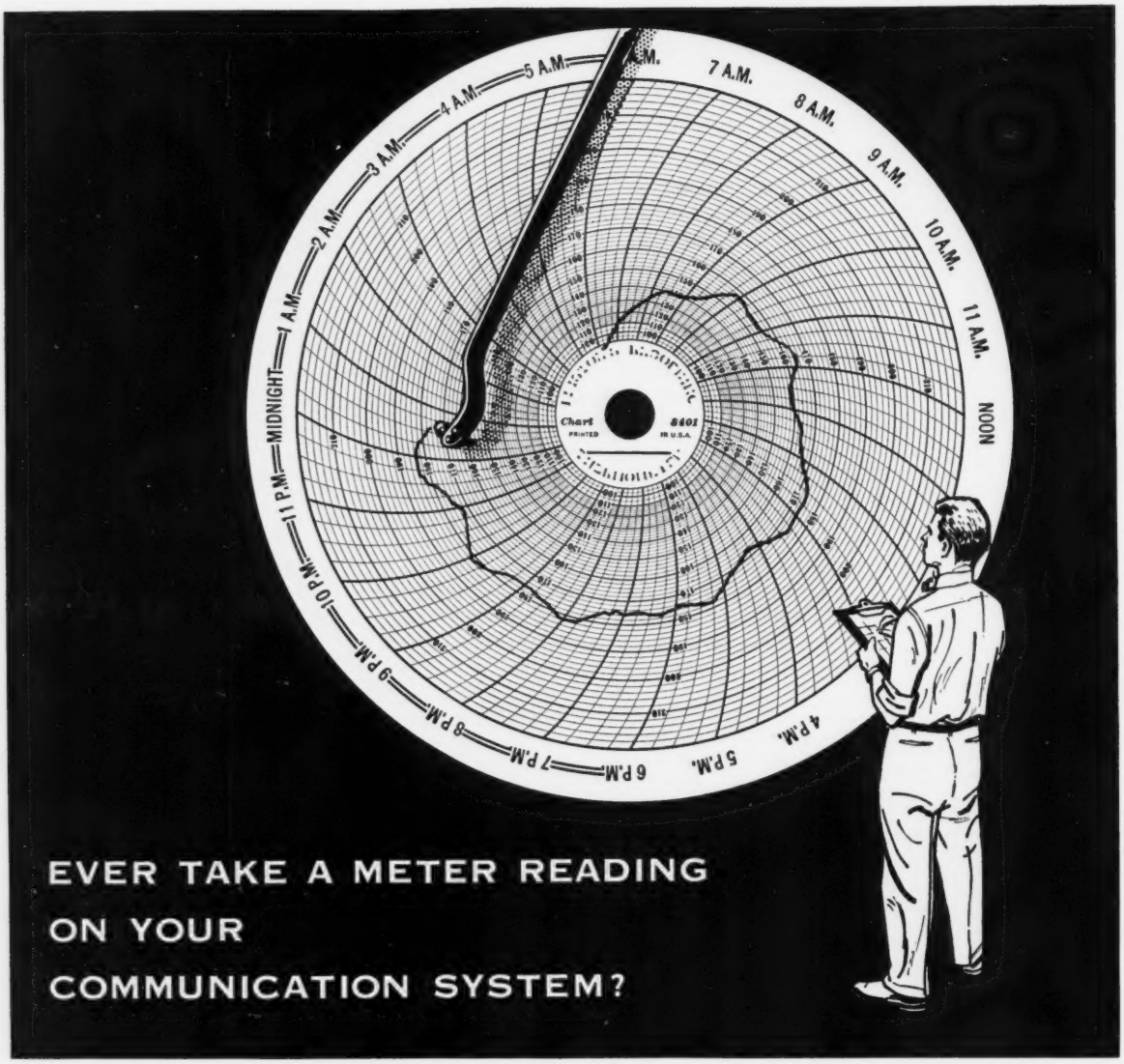
Third, it *saves money* since a little goes a long way. And "Scotch" 33 lasts longer, too.

Try this remarkably tough plastic tape yourself. See how it resists weathering, moisture, acids, oils and alkalies. See how it helps *you* save! For complete facts and specifications, write Minnesota Mining & Mfg. Co., Dept. EP-125, St. Paul 6, Minnesota.

3M COMPANY

The term "Scotch" and the plaid design are registered trademarks for the more than 300 pressure-sensitive adhesive tapes made in U.S.A. by **Minnesota Mining & Mfg. Co., St. Paul 6, Minn.**— also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N. Y. In Canada: London, Ont., Can.

SCOTCH BRAND Electrical Tape No. 33



EVER TAKE A METER READING ON YOUR COMMUNICATION SYSTEM?

Bell System communication engineers will help you take a good, close look at your communication system . . . *at no cost to you.*

Your Bell Telephone Company will make a comprehensive survey to help you get the best use of your facilities . . . local exchange, long distance, mobile, teletypewriter, metering and supervisory control . . . all the communications you use. More than one hundred studies are now underway for major pipe lines, power companies and railroads.

These surveys include recommendations to give your operation the best communications at the lowest possible costs. Many companies have changed, rearranged or added services on the basis of these surveys.

• If you are interested in a communication survey by Bell System experts without charge, call your local Bell Telephone representative now.

PRIVATE-LINE TELEPHONE

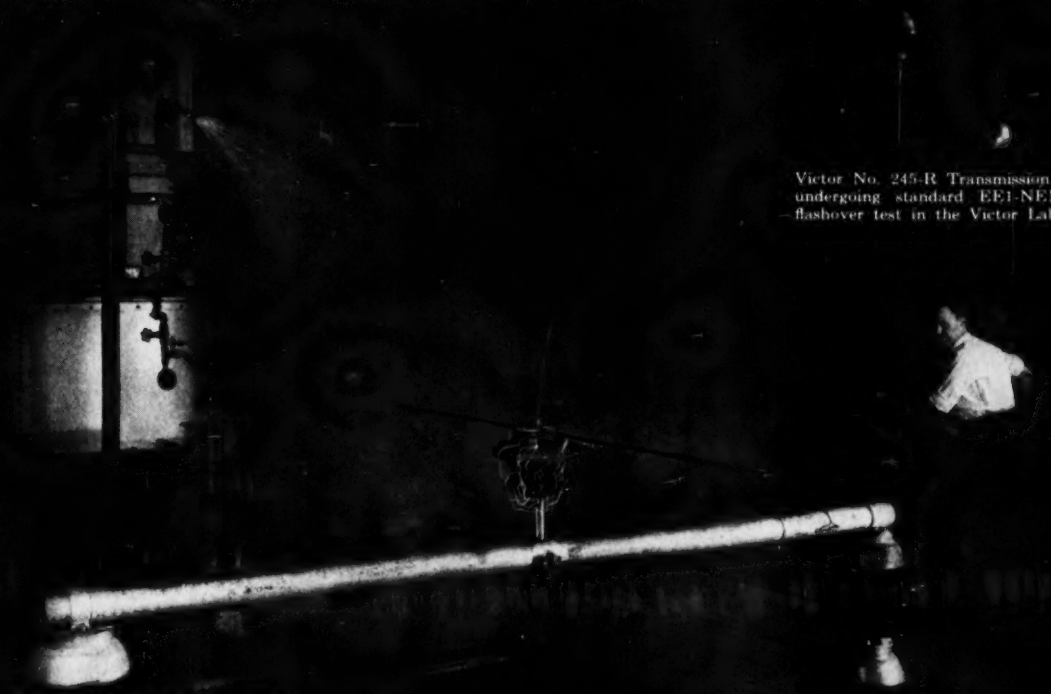
TELETYPEWRITER

MOBILE TELEPHONE

METERING CHANNELS

BELL TELEPHONE SYSTEM

WE MAKE OUR OWN RAIN . . .



Victor No. 245-R Transmission Pintype undergoing standard EEI-NEMA wet flashover test in the Victor Laboratory.

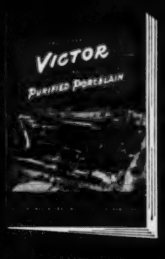
TO GIVE YOU

The superiority of Victor design and manufacture is proven in the laboratory as well as in the field. Take Victor High Voltage Pintypes, for example. Here, in the wet flashover test shown above, the insulator is being subjected to controlled artificial rain while 60-cycle current is applied in gradually increased voltage steps until flashover occurs.

This is only one of the many tests which are constantly being made in the Victor Testing Laboratories to assure you of highest quality and conformance to specifications. That is why Victor Transmission Pintypes give you proven wet weather protection and longer, trouble-free service on your lines. Choose Victor the power man's best buy!

VICTOR No. 245-R
EEI-NEMA Class 56-3

FREE BOOKLET gives you the full story of how Victor Insulators are made, how and why Purified Porcelain was developed. Write us for your copy.



Specify Victor Insulators!

VICTOR INSULATORS, INC., VICTOR, N. Y.

Low and High Voltage Pintypes • Suspensions • Guy Strains • Spools • Switch and Bus Insulators • Custom Designed Porcelain

Wagner
TRANSFORMERS
...the choice of leaders
in industry

Specify Wagner

They meet the NEW EEI-NEMA standards
and offer many PLUS features

No matter how varied your requirements may be, the Wagner line of Distribution Transformers will meet those requirements. *The line includes every rating and design listed in the EEI-NEMA Fifth Report.* When you specify WAGNER, you know that you'll get all the standardized electrical and mechanical features that mean easier installation and greater convenience in handling and maintenance . . . But you'll get PLUS values, too! All Wagner pole-type single-phase transformers in ratings 167 kva and below are furnished with the Wagner Form W element that permits a liberal design in small size, light weight transformers that give excellent electrical performance. All Wagner pole-type transformers in round tanks have covers sealed to the tank with the Wagner SHUR-SEAL Clamping Ring that prevents "breathing" and gives true sealed-tank construction. You get extra years of service-free transformer life because Wagner Distribution Transformers are filled with an inhibited oil to reduce oxidation and retard the formation of acids and sludge.

When you specify WAGNER, you get the benefit of improved design, better performance and longer transformer life. And in addition—Wagner has a nationwide organization to provide fast, convenient service, with branches in 32 principal cities.

Get in touch with your nearby Wagner branch today. Write for your copy of Bulletin TU-180. It gives complete information on Wagner Distribution Transformers.

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EST. 1891

WAGNER ELECTRIC CORPORATION
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ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS – AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

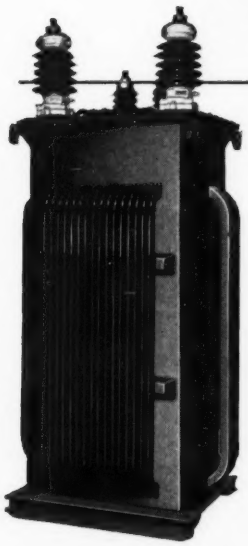
Distribution Transformers

SINGLE-PHASE

Wagner

TYPE HEB

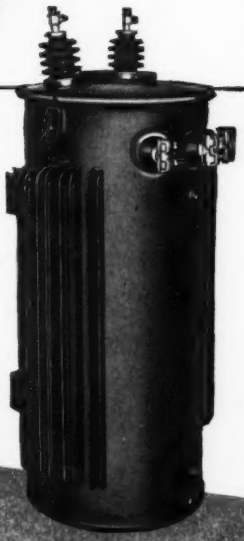
100 Kva, 2400/4160Y to 120/240 volt transformer shown.



Wagner

TYPE HEL

333 Kva, 34400 to 7200 volt transformer shown.



Wagner

TYPE HEK

50 Kva, 12000 to 120/240 volt transformer shown.

THREE-PHASE

Wagner

TYPE HPB VERTICAL

112.5 Kva, 2400 to 208Y/120 volt transformer shown.

Wagner

TYPE HPK

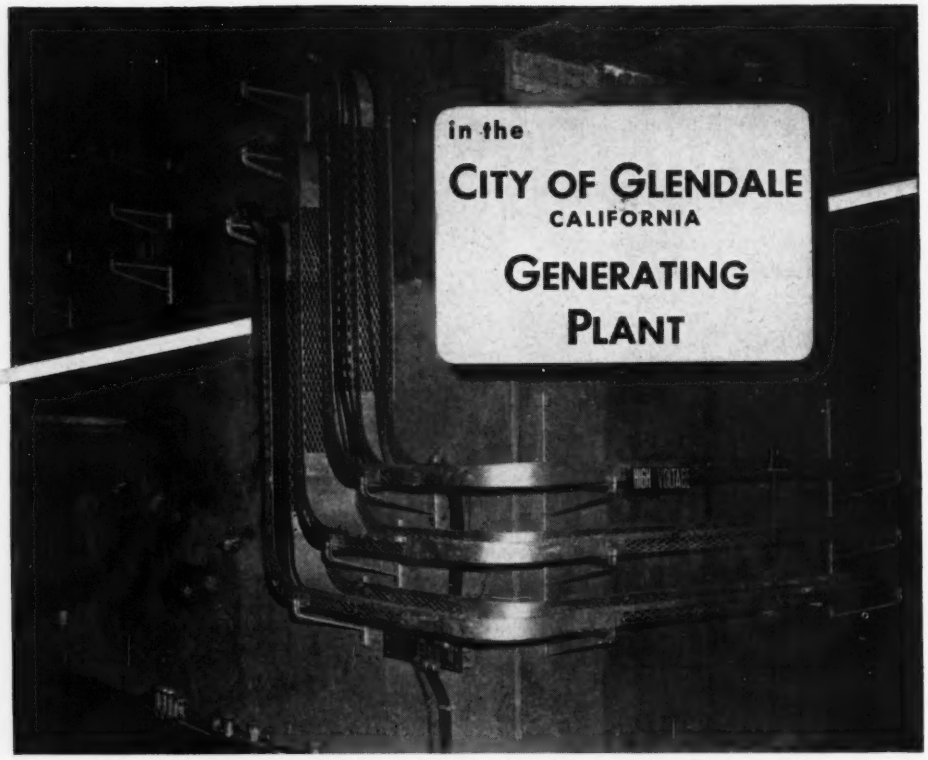
225 Kva, 7200 to 240 x 480 volt transformer shown.

Wagner

TYPE HPB

75 Kva, 2400 to 240 x 480 volt transformer shown.

T53-13



Cope CABLE TROUGH AGAIN PROVES ITS

... Simplicity of Installation
... All-around Economy
... Accessibility to Cable

The versatility and simplified design of the Cope system of Cable Trough and Fittings make it readily applicable to any layout. This is clearly seen in the above photograph showing part of a recent installation at the Glendale Generating Plant. Notice how the Cope Trough is supported by simple wall brackets. Observe, too, that both vertical and horizontal runs are made with standard trough and fittings—turns, branches and reductions.

The High Voltage sign on the top tray emphasizes another Cope Trough feature. Here 480 volt Neoprene jacketed power cables are carried in the same tray with control cables. A barrier strip provides adequate separation while permitting easy access to the lines. The lower tray will carry 2400 volt Neoprene jacketed power cables and ultimately will be equipped with a solid Cope Trough cover. Future expanding needs will be met by adding a fourth tray above the other three.

Learn how you, too, can cut cable installation costs and labor . . . write for bulletin on Cope Cable Trough.

T. J. Cope INC.

You know Cope by these products

711 SOUTH 50th ST., PHILADELPHIA 43, PA.

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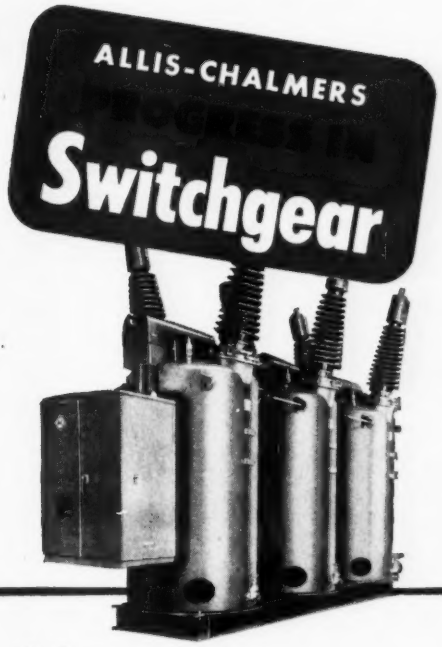
PORTLAND 4, ORE.
Phone BR 1702

FRED W. CARLSON
2307 FIFTH AVE.
SEATTLE 1, WASH.
Phone ELIOT 6630

RELIABILITY

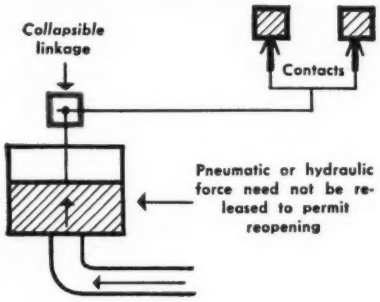
In Large Circuit Breaker Operation Depends Upon

THIS BASIC DIFFERENCE



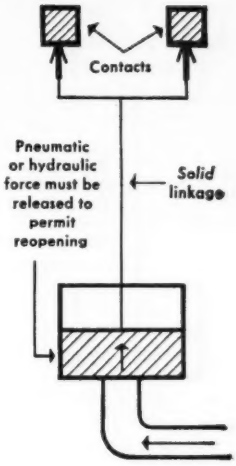
Allis-Chalmers *Mechanically Trip-Free* Mechanism

When opening after closing against a fault, the Allis-Chalmers operating mechanism does not require dumping of oil or air pressure. Trip coil simply releases a latch and the closing linkages collapse, allowing contacts to open at full speed. Operation is fully mechanically trip-free.



Other Operating Mechanisms

Air or oil pressure used to close contacts must be dumped — fast—to permit contacts to open. To do this takes a whole sequence of devices, including valves and solenoids. Everything must work perfectly. Otherwise breaker will be held closed or slowed in opening.



Opening the breaker when it closes against a fault, regardless of the position or condition of the closing mechanism, is the protective function of the breaker. To be fully protective under all circumstances, every one of your breakers should have a fully mechanically trip-free mechanism. For further details on what mechanically trip-free operation means to you, call your nearby Allis-Chalmers District Office or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4166

ALLIS-CHALMERS

Burying Cable on TOP of the Ground

Recently an electric railway company decided on a line extension. Before they could lay the track they had to raise the grade of an existing roadway. Fortunately someone thought of burying the underground signal cable the easy way.

The electric railway scooped out a shallow depression, lined it with sand, put in the Simplex-ANHYDREX Signal Cables, covered them with sand, and then they filled the roadway to a depth of about four feet with fill. The top of the concrete pedestal will be at grade.

The electric railway showed good judgment on two counts. First, they buried the cable in the least expensive way and, second, they used Simplex-ANHYDREX Signal Cable which will give them dependable service for a long time to come.

Why did the railway buy ANHYDREX Signal Cables? Because the Anhydrex insulation will retain its electrical and physical properties indefinitely. This insures long life and dependable operation. The cable is easy to install, splice and terminate. It has no metallic sheath to crack from vibration or deteriorate from electrolysis. It does have a special metallic tape to resist termites, etc.

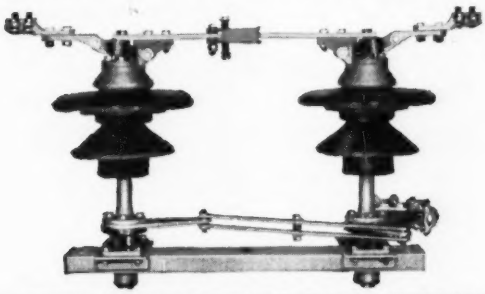
These are a few of the reasons why railways, public utilities and industrial plants are using ANHYDREX Cables for signal, control and communication services.

Simplex
WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.

HORIZONTAL BREAK SWITCHES

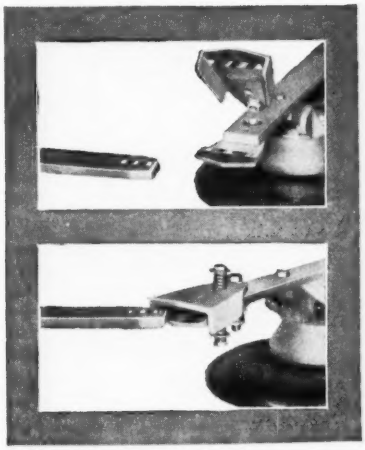
Ideal switch for conditions demanding low original cost, ease of installation and minimum maintenance expense for bypassing, disconnecting and bus sectionalizing. Can be mounted horizontally, vertically and in an inverted position. The individual poles of these switches can be mounted in a horizontal or vertical configuration.



SCHWAGER-WOOD TYPE DSB SWITCH

(Illustrated: 34.5 KV-600 Amperes)

Group operated horizontal break switch with *two* rotating insulator stacks per single pole. Available in voltage ratings of 23 KV to 69 KV in current ratings of 400 and 600 amperes, and in voltage ratings of 115 KV and 161 KV in current ratings of 600 and 1200 amperes.



The contact shoe is designed to protect the silver to silver contact points. Ease of operation is assured under all weather conditions.

Technical information and prices available on request from any of our regional representatives or the home office, 8024 S.W. 35th Avenue, Portland 19, Oregon. Phone CHerry 7588

SCHWAGER-WOOD CORPORATION

High Voltage Switchgear • Substation Design, Equipment • Bus Fittings, Connectors **PORTLAND, OREGON**

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Walter E. Thompson Co.
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Central States Eng. & Prods. Co.
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Phone Valentine 8895

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Russell D. Heath
Phone DIgby 9-1500

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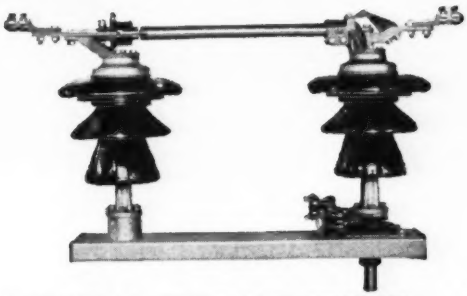
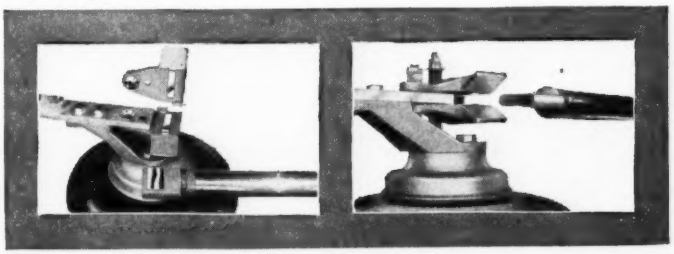
Love Electric Co.
Phone BR 4104



SCHWAGER-WOOD TYPE SSB SWITCH

(Illustrated: 46 KV-600 Ampere)

Group operated horizontal break switch with *one* rotating insulator stack per single pole. Available in voltage ratings of 7.5 KV to 34.5 KV in current ratings of 400, 600 and 1200 amperes and in voltage ratings of 46 and 69 KV in current ratings of 600 and 1200 amperes.

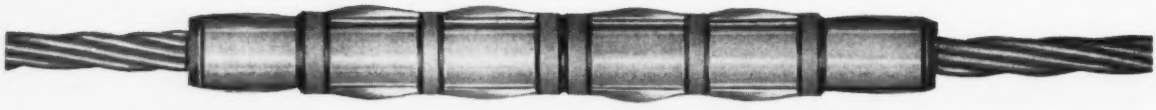


Generous use of silver assures perfect contact. Knee-action is provided for easy all-weather operation.

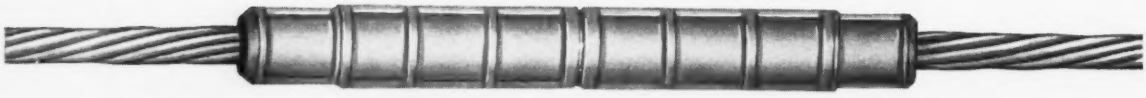
Nicopress

FOR LARGE CONDUCTORS AND HIGH-STRENGTH STRANDS

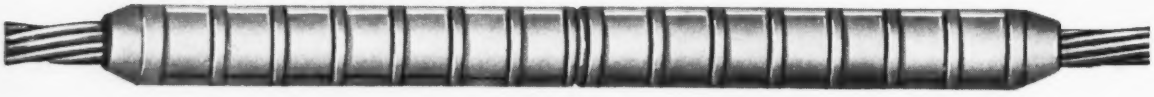
**Light in weight—Holds full strength of conductor—
High in conductivity**



Completed NICOPRESS Splice on 3/0 Copper Conductor



**Completed NICOPRESS Splice on 3/8" Extra High Strength
Copperweld Strand**



**Completed NICOPRESS Splice on 3/8" Extra High Strength
Galvanized Steel Strand**

Nicopress Sleeves and Tools Patented in U. S. and Foreign Countries. "Nicopress" Registered in U. S. and Foreign Countries.

THE NATIONAL TELEPHONE SUPPLY COMPANY

The National Telephone Supply Company

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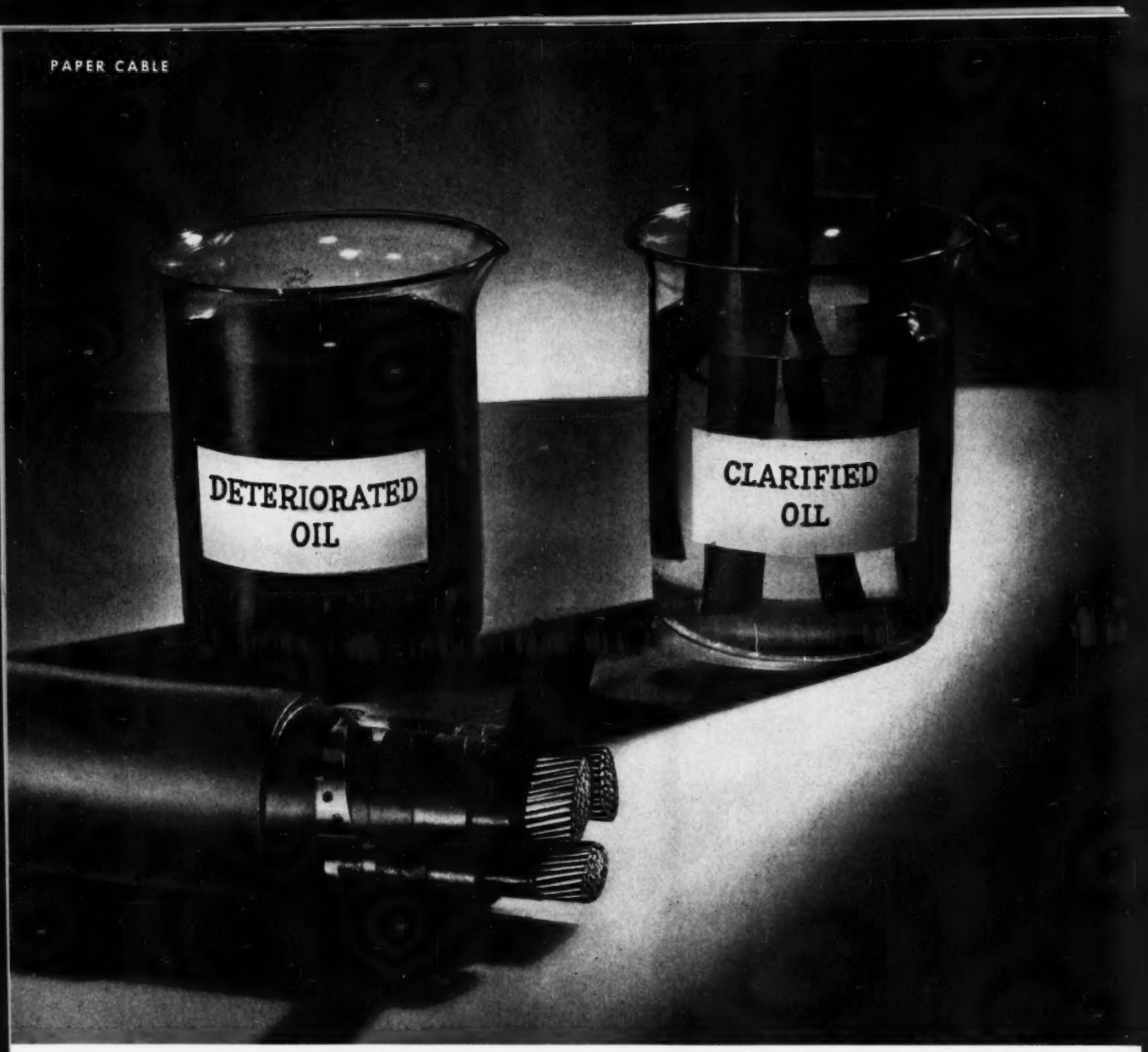


CARBON BLACK TAPES in ANACONDA Type CB Cable keep deterioration products outside dielectric field . . . lengthen cable life.

"Hungry" tapes add life to this cable

Colloidal carbon can purify and stabilize many fluid mixtures—a property important to chemists. It's important, too, to cable engineers. For it can do the same for impregnating oil in paper cables. At Anaconda, tests with cables made with carbon-black tapes proved it!

These tapes are "hungry" for oil-deterioration products created by high heat and electrical stress. They stop ionization discharges. They keep insulating oil "alive." The life span of ANACONDA Type CB* (Carbon Black) Power Cable greatly exceeds that of ordinary impregnated paper-insulated cable. Type CB cables in service over 12 years have proved their superiority.

For greatly extended sheath life of ANACONDA Type CB Cable, specify ANACONDA F-3** alloy. This superior alloy-lead sheath won't age-harden . . . resists slow-bending fatigue, creep, burst and abrasion. Cable joint sleeves also are available in this same alloy. They all offer higher tensile strength, a 50% higher bursting strength than copper-lead, lower creep rate and similar increased resistance to bending fatigue and vibration.

For the full story on this superior, time-tested cable, see your Anaconda Representative. *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.* 53331

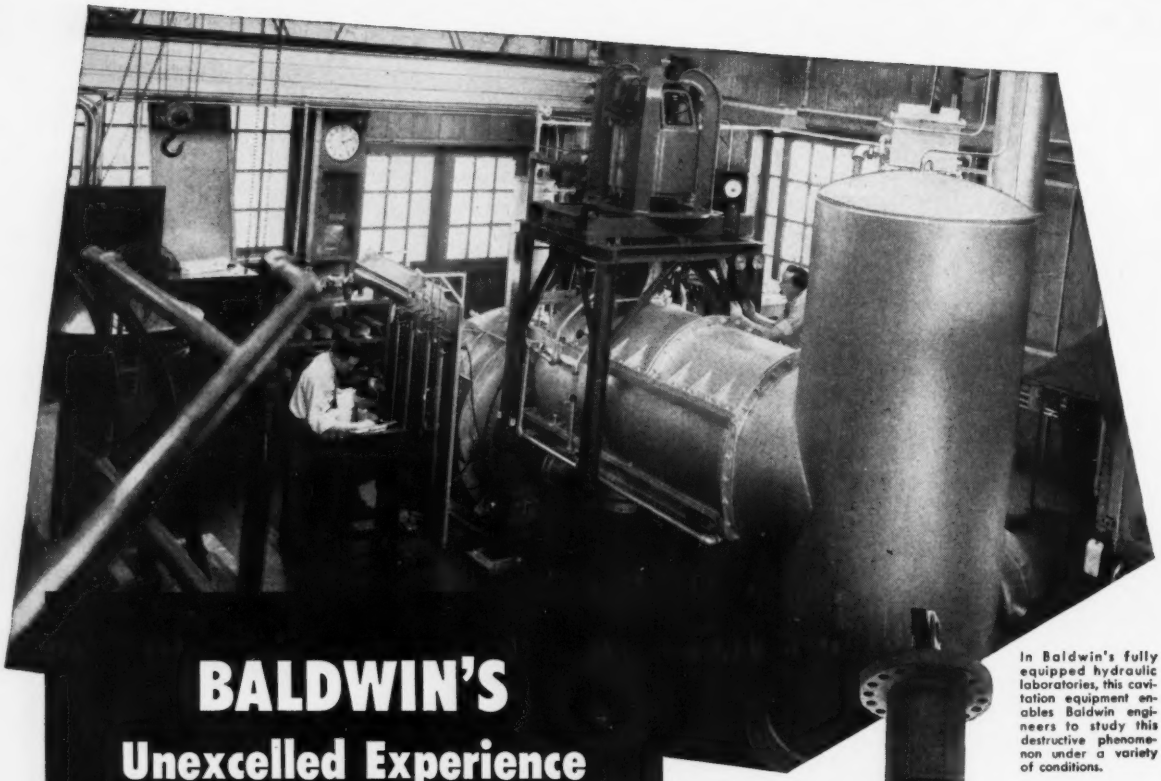
*CB — Carbon Black (U. S. Patents 2,102,129, 2,405,853) Reg. U. S. Pat. Off.

**F-3 — Arsenic-Lead Alloy (U. S. Patents 2,300,788, 2,375,755, 2,504,600 and 2,570,501) Reg. U. S. Pat. Off.

ANACONDA®

Service and overhead distribution cables, bare and weatherproof, including ACSR • signal, control and communication cable • portable cords and cables • network cables • airport and series lighting cables • mine cables • magnet wire • copper, aluminum and copperweld conductors • wire and cable accessories.

ANACONDA ON THE PACIFIC COAST: Plant at: Orange, Calif. District Offices at: Los Angeles, Calif.; San Francisco, Calif.; Seattle, Wash.



In Baldwin's fully equipped hydraulic laboratories, this cavitation equipment enables Baldwin engineers to study this destructive phenomenon under a variety of conditions.

BALDWIN'S
Unexcelled Experience and Research Pay Off Again With 94% Efficiency of Center Hill Turbines

Here is the one-piece, 127,200 lb., 186⅛ in. runner for the Baldwin 62,500 hp Francis-type turbine at Center Hill and Wolf Creek Dams.

Baldwin's continuing research, combined with experience in designing and building all types of turbines from as early as 1825, is paying a big dividend to the Corps of Engineers at its Center Hill and Wolf Creek Dams.

Initial tests of one of three 62,500 hp vertical Francis-type turbines at Center Hill showed a maximum attained efficiency (at 105.9 rpm and 160 foot head) of 94% . . . one of the best efficiency records ever obtained for Francis-type units. Since the six Baldwin-built turbines for Wolf Creek are identical, the Corps of Engineers has the benefit of similar high efficiency for its two Cumberland River Valley hydro-electric plants which will generate about 1218 million kwhr each year.

Whatever your hydro-electric project, Baldwin engineers will be glad to put their vast experience and resources at your service to help you get top performance. Experienced with all four basic type of turbines . . . Francis, Kaplan, Pelton Impulse and Propeller . . . they can give you an unbiased opinion of the type best suited to your flow and head conditions.

For details about Baldwin research and some interesting turbine installations, please write for Bulletin 1000 to Department 5153, Baldwin-Lima-Hamilton Corporation, Philadelphia 42, Pa.

BALDWIN BLH LIMA-HAMILTON

BALDWIN-LIMA-HAMILTON

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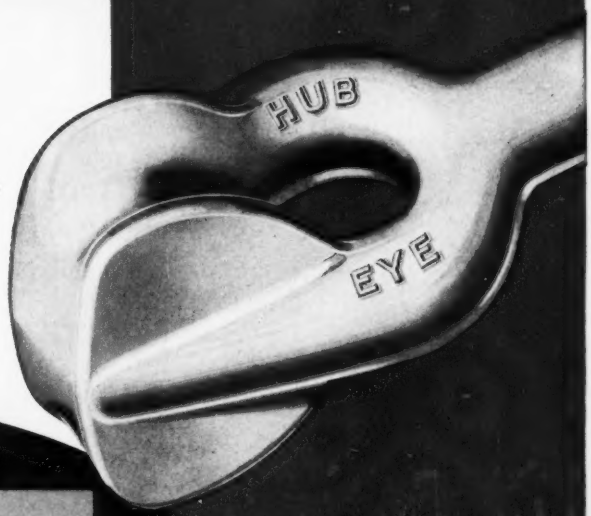
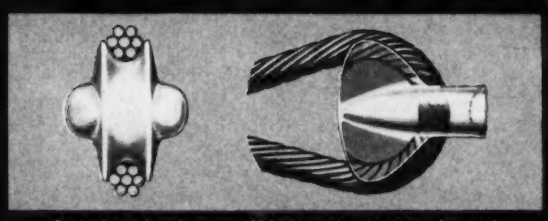
"For the Best GUYS in the World"





End view showing sidewall support of strand by Hubeye.

Side view showing lay of strand in Hubeye. Fully rounded bearing area is provided.

Typical Hubbard Guying Items

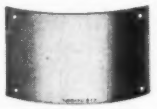
Angle Hubeye Bolt

Three-Hubeye Anchor Rod

ServiSleev

Strain Plate No. 7577

Storm Guy Hook No. 6001



Strain Plate No. 7575

Storm Guy Hook No. 7585

From arm to anchor, Hubbard has a complete line of guying accessories that are "good for the life of the pole." There's a variety of anchors to meet every soil condition, to carry any load . . . guy protectors that are designed for maximum strength and visibility . . . Servi-Sleevs for the best looking serve in five seconds flat . . . Hubeye anchor rods and bolts with strand protection . . . clamps that grip the strand and won't let go . . . strain plates . . . storm guy hooks . . . hundreds of items that make it easier for the lineman to service the "best guys in the world."

HUBBARD AND COMPANY

ESTABLISHED 1843

PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA

"Hang the Load on Hubbard Hardware!"

Overhanging branches removed and trees shaped properly for Utility in Beverly Hills

SURGICAL LINE CLEARANCE BY DAVEY

Davey is doing line clearing for 12 Public Utilities on the Pacific Coast —most of them served continuously for over 20 years. Davey specialized equipment and efficient methods save money . . . Davey surgical pruning benefits trees—builds goodwill.

DAVEY LINE CLEARING
DIVISION OF
DAVEY TREE SURGERY CO., LTD. OF CALIFORNIA
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Story Bldg., Los Angeles, TUcker 1929

Lapp Insulator Co. Inc., Leroy, N.Y.
United States Rubber Company — US — Trade Mark
Burndy Engineering Co. Inc. New York
EARL S. Condon COMPANY
Engineering Representatives
3460 WILSHIRE BLVD. LOS ANGELES 5
DU 1-3951
CARMA MFG. CO.
Cole ELECTRIC CO.
PLP

LETTERS TO THE EDITOR

Still in Demand

To the Editor:

As you know we have been playing Carl Taylor's recorded speech* in and around Reno for the past few months. In almost every case there are out-of-state guests present and they have written to me asking to mail them the speech for a meeting of their particular groups. This has been done.

Now . . . the Kiwanis Club wants me to send it to their national headquarters with the thought in mind of distributing it to some 5,000 clubs over the country. The secretary of the Lions wants to mail it to the international president and the same thing may happen . . .

A. L. Pierce
Manager, New Business Department
Sierra Pacific Power Co.
Reno, Nev.

Not in Conflict

To the Editor:

On page 46 of the August edition of Electrical West, Jim Evans' letter concerning the National Electrical Code was printed. In his letter he makes reference to a seeming conflict in the National Electrical Code concerning wire current-carrying capacities. I think that, perhaps, Jim is confusing the wire current-carrying capacity of the State of California Code with those of Tables 1 and 2 of the National Electrical Code for, if you consult the 1953 edition of the code, the current-carrying capacities for No. 10 and No. 8 type R wire are different than Jim Evans states in his letter.

Therefore, this being the case, Section 2403 is not in conflict to Tables 1 and 2 and, incidentally, I think that something should be published to that effect . . .

Charles L. Smith
Secretary
National Electrical Code Committee, NFPA
Chicago, Ill.

Safety Rules Book

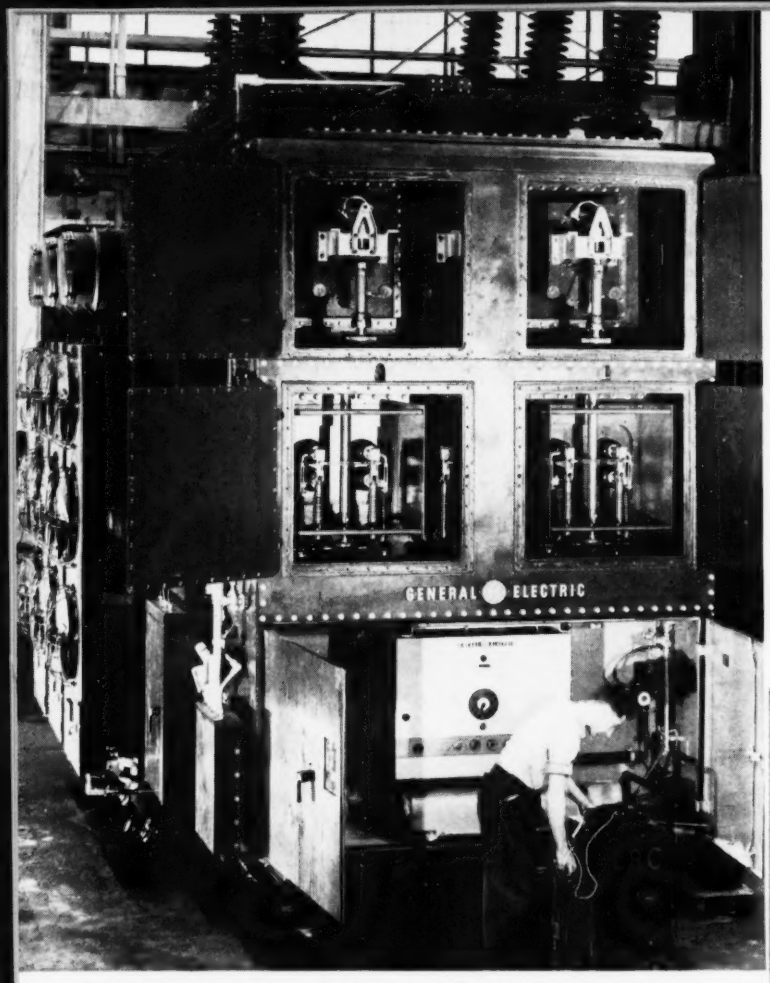
To the Editor:

I read with great interest the article in the September issue of your magazine entitled "Adopt Uniform Safety Rules."

I would appreciate your informing me where I might write to obtain a copy of this Pacific Coast Electrical Assn. safety rule book.

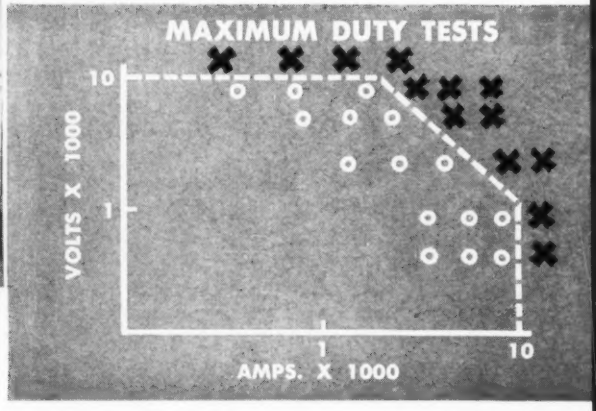
Fons J. Hughes
Safety Engineer
Pacific Power & Light Co.
Portland, Ore.

What Kind of an America Do You Want?, an address before the PCEA, tape recorded by Electrical West and carried in the August 1952 issue.



FINAL TESTS on control wiring are made prior to shipment. Large, hinged doors, re-usable Nitrile rubber gaskets, and roomy compartments simplify field inspection and maintenance.

No need to worry if a short circuit occurs during a tap change



G-E Load-Ratio-Control operates successfully even under maximum short-circuit duty

If a system short circuit occurs while a tap change is under way, General Electric Load-Ratio-Control is designed to complete the operation successfully . . . *even under the maximum short-circuit duty to which the transformer may be subjected.*

Contactor interrupting tests, made during the design of each standard LRC mechanism, assure you of dependable operation. Oscillograms of each test shot record the current and voltage values and the arcing time. These points are plotted on a logarithmic chart like that shown above. Points showing excessive arcing time are recorded as crosses. Satisfactory tests are recorded as circles. A line enclosing area of satisfactory performance under short circuit defines the range of normal application of contactor.

From such test data, G-E transformer designers are furnished an application chart for each standard equipment that shows the range of transformer ratings to which the equipment can be applied.

Remember too, that in G-E load-ratio-control, the four design factors: insulation life, arcing-tip life, mechanical life and short-circuit duty are all *co-ordinated* to give you good service, longer periods between inspection and less maintenance.

For full information on G-E Load-Ratio-Control, contact your nearest G-E Apparatus Sales Office, or write General Electric Company, Section 421-7, Schenectady 5, New York.

You can put your confidence in—

GENERAL ELECTRIC

APPARATUS SERVICE SHOPS

Atlanta, Ga.
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Milwaukee 3, Wis.
Minneapolis 12, Minn.
New York 14, N. Y.
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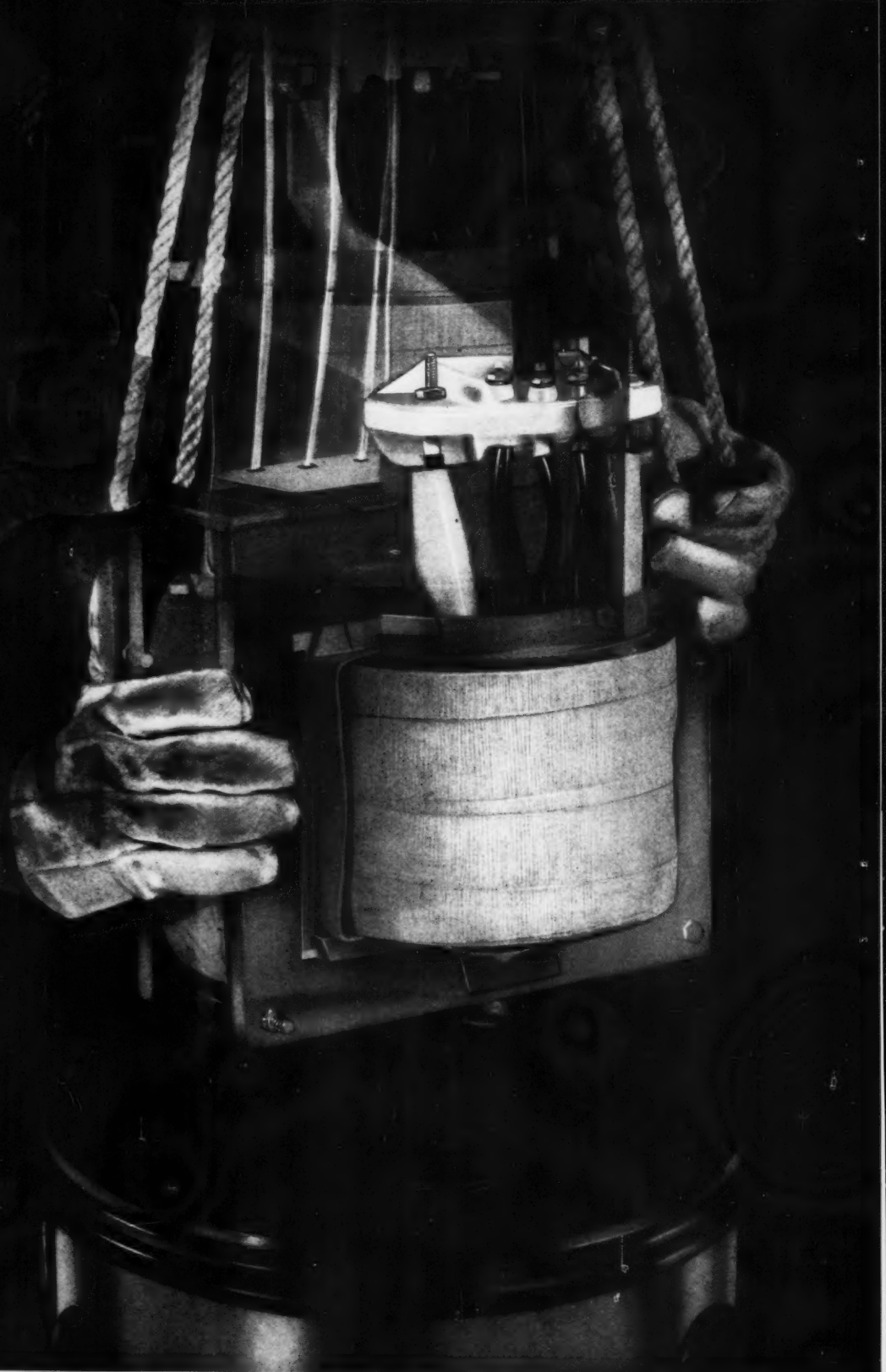
Pittsburgh 6, Pa.
Portland 18, Ore.
Richmond 24, Va.
St. Louis 10, Mo.
Salt Lake City 4, Utah
San Francisco 3, Cal.
Seattle 4, Wash.
Toledo 4, Ohio
York, Pa.
Youngstown 5, Ohio

DISTRIBUTION TRANSFORMERS

different from others because.....



....Nationwide service facilities *keep your transformers "on the line"... provide day and night emergency or quick reconditioning service*

Whether a sudden storm brings chaos to your system, or repair work piles up . . . here's the simple, easy way to get your inactive transformers of any make back "on the line" . . . faster.

NATIONWIDE SERVICE FACILITIES, through General Electric service shops, are as near as your telephone (see list of cities at left). Burned out core-and-coils can be replaced, or your 1½- and 3-kva transformers can be up-rated to 3 or 5 kva, or in some cases 7½ or 10 kva. Special equipment, genuine factory parts, and trained personnel assure prompt service and top performance.

REMEMBER... all transformers are not alike . . . compare the General Electric plus features in the chart below and see for yourself.

For more information on distribution transformers, either unit-type or conventional, contact your nearest G-E sales office, agent or distributor, or write to General Electric Company, Section 431-10, Schenectady 5, New York.

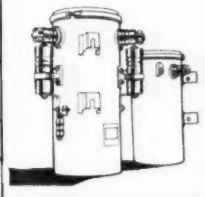
You can put your confidence in —

GENERAL ELECTRIC

ALL TRANSFORMERS ARE NOT ALIKE

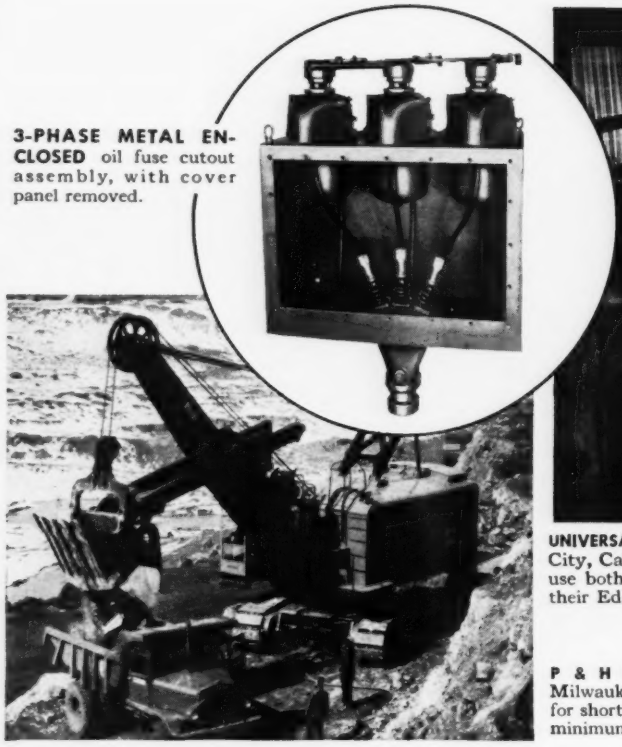
(make this simple comparison and see)

FEATURE	General Electric	Mfr. A	Mfr. B	Mfr. C	Mfr. D	Mfr. E
Production-line impulse testing	YES	NO	NO	NO	NO	NO
Nitrile rubber gaskets at all tank openings	YES	NO	NO	NO	NO	NO
Strenicor pressure terminal clamps	YES	NO	NO	NO	NO	NO
Insulated clamp-type connectors on tank wall hv bushings	YES	YES	YES	NO	YES	YES
One-piece cover band	YES	NO	NO	NO	NO	YES
Terminals designed for both copper and aluminum conductors	YES	NO	NO	NO	NO	NO
Gapped valve-type arresters	YES	NO	NO	NO	NO	NO
Nationwide company-operated service facilities	YES	YES	NO	NO	NO	YES



UNIT-TYPE CONVENTIONAL

"Take your choice G. E. makes both"



3-PHASE METAL ENCLOSED oil fuse cutout assembly, with cover panel removed.

UNIVERSAL INTERNATIONAL PICTURES CORP. studios at Universal City, Calif., here shown filming "All American" starring Tony Curtis, use both single-phase and 3-phase G-E oil fuse cutout assemblies in their Editorial Building vault.

P & H ELECTRIC SHOVELS (manufactured by Harnischfeger Corp., Milwaukee, Wis.) are equipped with G-E oil fuse cutout assemblies for short-circuit protection of electrical equipment where greater safety, minimum space and ease of operation are so essential.

Electric shovel or movie studio . . . both use G-E oil fuse cutouts for low-cost switching

Metal-enclosed assemblies, gang-operated, provide maximum personnel safety, neat appearance and service dependability

Wherever the job of overcurrent protection is coupled with the need for some load switching, General Electric oil fuse cutout assemblies combine both functions with greater safety of operation, long life and low cost. Their high interrupting rating (up to 11,000 rms amperes), long contact life, and quiet, almost noiseless operation, make them the ideal fusing device where installations must be made indoors or in working areas. They may be wall or direct-to-equipment mounted.

Metal-enclosed assemblies of G-E oil fuse cutouts, either single or three-phase, provide a neat appearance —all wiring and electrical connections completely enclosed in a grounded steel cabinet, factory assembled for easy, fast installation. Just connect the unit, fill the cutouts with oil, and insert fuse link or disconnect blade. Such cutouts can also be furnished for mounting on steel skids which make them ideal for portable protection in mines, oil fields, naval yards, etc.

G-E oil fuse cutout features include:

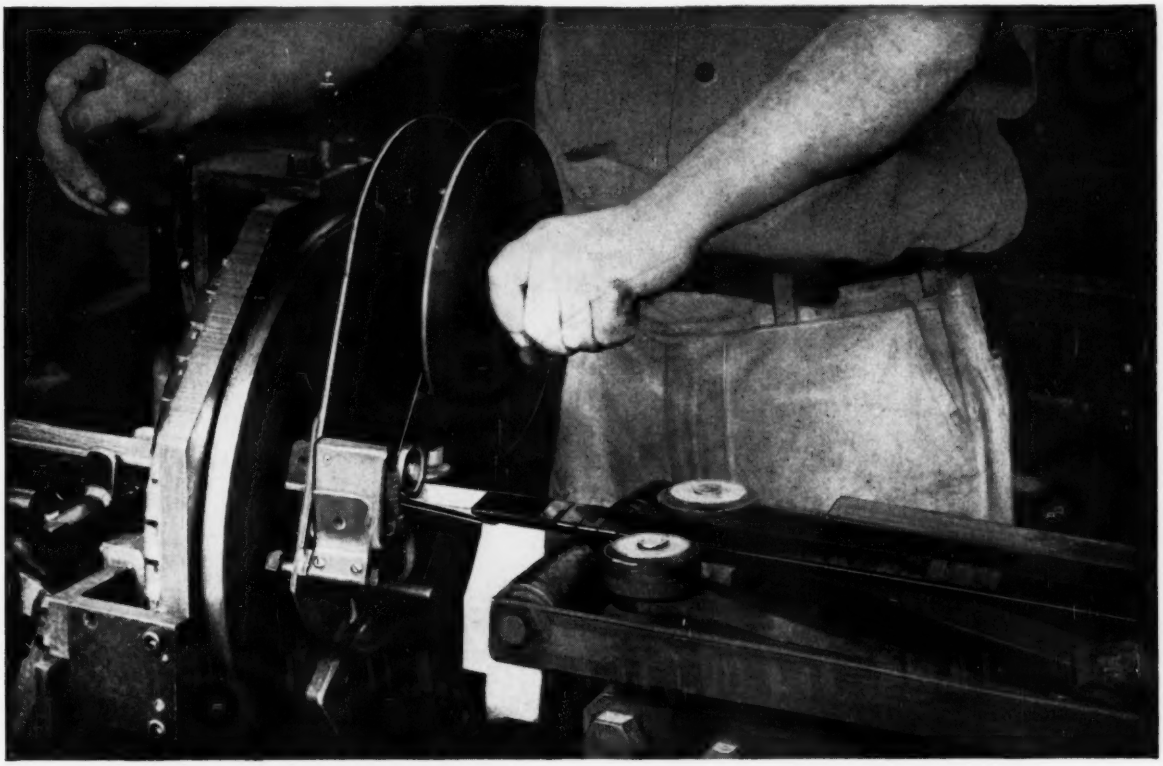
- **No expansion chamber required for full interrupting capacity**
- **Simple re-fusing, even on gang-operated assemblies. Pre-formed fuse links easily slip into place**
- **Silver-plated, heavy forged copper contacts with special arcing tips . . . minimize wear**
- **Leads brought into cutout housing above oil level—no gasketed joints under oil pressure**

G-E oil fuse cutout assemblies are ideal for utility, industrial, commercial and institutional use within the range of 2400 through 7200 volts.

For full details, contact your nearest G-E Sales Representative or write for Bulletin GEC-863 to General Electric Co., Schenectady 5, N. Y. 413-2

You can put your confidence in—

GENERAL ELECTRIC



Wrap bus bars quickly, easily, with IRVINGTON heat-and oil-resistant TEMFLEX® 105 Tape

With its high modulus of elasticity, Irvington's Temflex 105 Tape is exceptionally suitable for use in taping heads to produce close, carefully lapped wraps on bus bars or other conductors — without excessive elongation of the tape.

Flexibility, strength and excellent elongation make Temflex 105 Tape equally adaptable to the *hand* wrapping of irregular surfaces — such as cable splices or joints in bus bars. Tape bakes easily to a homogeneous mass — effects substantial economies over other types.

Temflex 105 Tape offers unusual resistance to heat and oil — it is based on the same formula that has made Temflex 105 Plastic *Tubing* the standard wherever service calls for continuous operation in air at 105° C., or in oil at 90° C.

Look to
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for Insulation Leadership

- INSULATING VARNISHES
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- CLASS "H" INSULATION

Get the full facts on characteristics and application of this Irvington insulating material — mail the coupon for technical data sheet.

Send this convenient coupon now

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Please send me technical data sheet on Temflex 105 Tape.

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Street.....
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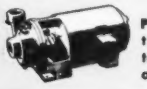

PUMPS — Integral types from ¾ in. to 72 in. discharge and up.

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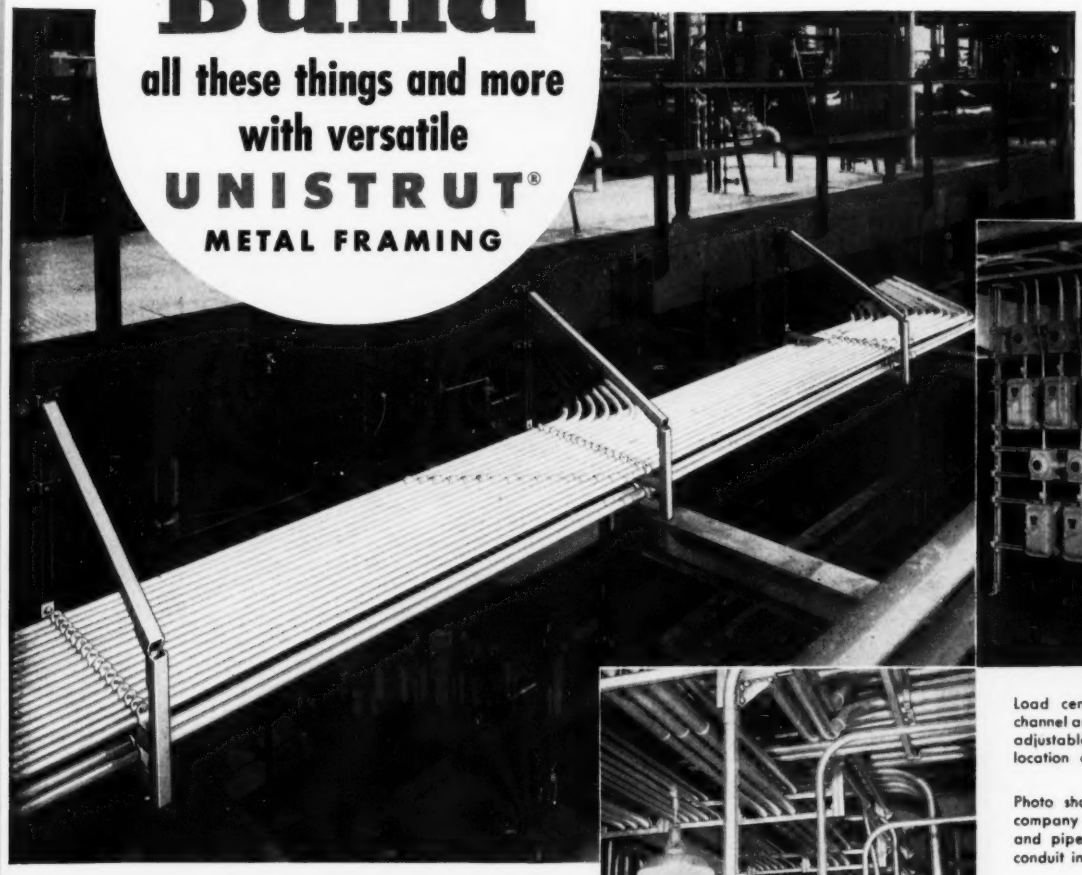
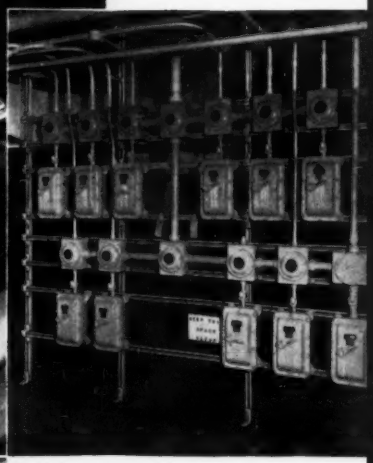
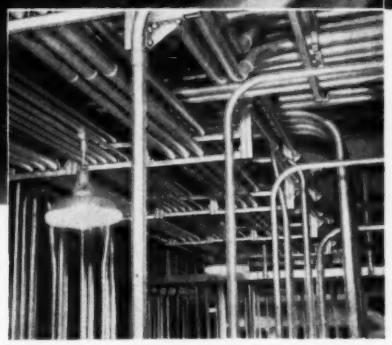
all these things and more with versatile UNISTRUT® METAL FRAMING



UNISTRUT framing and pipe clamps support heavy banks of conduit leading to motors in plant of large pharmaceutical manufacturer.

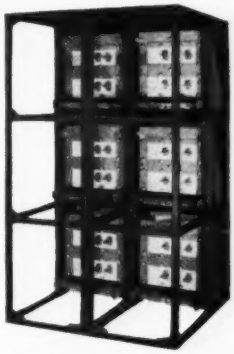




Load center built with UNISTRUT channel and fittings. Framing system's adjustable feature permits quick location of gear to spot desired.

Photo shows how a large power company used UNISTRUT framing and pipe clamps to rack rows of conduit in steam plant installation.

Framework of UNISTRUT channel and fittings support switch gear in typical cubicle installation.



Rack conduit, cable and pipe—
Frame power load centers—
Mount switches, meters and panelboards

Those who use completely adjustable UNISTRUT metal framing know it's easy to handle and quick to erect—that it provides great strength without bulk—that adjustments, changes and additions are easily made at any time.

The UNISTRUT system cuts costs, too. You save time in engineering detailing and eliminate the need for trained erection crews—anyone can build with UNISTRUT channel and fittings. No drilling, no welding, no special tools or equipment—all you need is a hacksaw and a wrench to build wire and cable reel racks, fluorescent fixture supports, transformer vaults, electric motor mounts, bus duct supports and many other structures. It will pay you to try UNISTRUT framing on your next job.

Basic Components of the UNISTRUT Metal Framing System

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Free 84-page Pocket Catalog 800

FOR THE MAN ON THE JOB! 84 pages packed with pictures, drawings, ideas and data on how to frame, rack, mount, suspend and support all kinds of electrical equipment with UNISTRUT channel and fittings.

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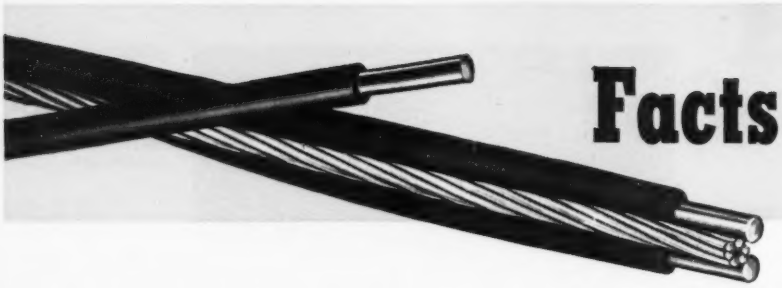


Facts you should

Rome Aluminum Triplex offers savings up to 30% and better

Here is one of those rare opportunities for you to save real money, yet get maximum performance and improved appearance.

You save up to 30% and better over conventional Type SD service cable when you install Rome Aluminum Triplex Service Drop and Secondary Cable.

First you save on initial cost. Then you save time on installation because of lighter weight and less handling. For secondaries that means you can string longer spans with fewer poles. It is possible to use mid-span taps. You may eliminate crossarms, messenger rings, and use a minimum of hardware.

You save, too, on maintenance and service interruption because Rome Aluminum Triplex offers maximum resistance to storms, wind and ice loading as well as other exposure elements.

Its RoPrene (Neoprene) or RoLene (polyethylene) insulations protect against sunlight, heat, moisture, corrosive atmospheres and other operating hazards. There are no braids to rot or festoon. Conductors are more accessible because they have no common covering.

Better Performance

In addition to savings, you get better voltage regulation because of lower reactance in long and heavily loaded circuits. And finally you have a neater, cleaner installation . . . no cluttered, unsightly open wires.

For full information on Rome Triplex with copper or aluminum conductors send for Rome Bulletin RS-5 which gives specifications, dimensions, sag and tension data, and installation tips.

New 500-foot carton makes handling easier

Rome Aluminum Triplex can now be purchased in handy cartons of 500-ft. coils. Carton size assures easy storage and handling. Center knockout simplifies cable removal. This cable is also still available on 1,000-ft. reels.

know about Rome Aluminum

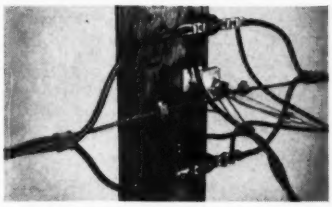
Tips on Connecting Aluminum

1. Clean surface of aluminum conductors thoroughly before making connection.
2. Use a liberal coating of compound on all joints and connections.
3. Do not use solder for joining conductors — pressure-type connectors are preferable.
4. Connector material should be aluminum or aluminum alloy. Where aluminum to copper connections are involved, a copper or copper-alloy insert permanently bonded to the over-all aluminum connector has proven generally satisfactory.
5. Protect finished joints from air and weathering by covering with compound, or other suitable material.

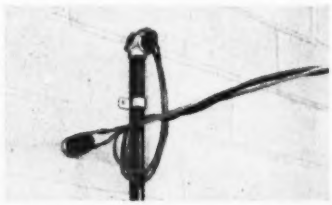
New Rome ACSR provides dependable operation

If you are planning new overhead distribution lines, it will pay you to specify Rome ACSR. Carefully controlled manufacture and testing of this product assure exceptional uniformity and dependability.

Typical service connections



Typical service tap connection at pole.



Typical dead end connection at house.

Fewer poles, longer spans with mid-span taps possible on secondaries.

Weatherproof Wire

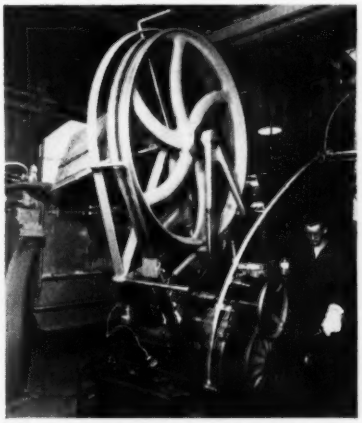
Regularly supplied with solid or stranded all-aluminum or ACSR conductors, covered with RoLene or RoPrene. Conventional URC triple braid covering can also be supplied.

New spin-casting wheel helps assure controlled methods

Rome Cable is one of the few manufacturers of aluminum conductors to use the famous Properzi casting wheel.

Molten aluminum is transferred to the casting wheel. Flowing in the groove of the wheel, sealed by a continuous band, the solidified aluminum emerges as a triangular cast shape.

A casting method such as this, plus careful, scientific compounding and application of insulating materials, permit Rome to control the quality of its aluminum products throughout every step of their manufacture.



In addition, thorough chemical and metallurgical research, plus extensive testing that is independent of production and sales, are your assurance of safety and long-lasting economy when you specify Rome aluminum wires and cables.

Send for your copy of Bulletin RS-5 on copper and aluminum self-supporting service drop and secondary cables.

It Costs Less to Buy the Best

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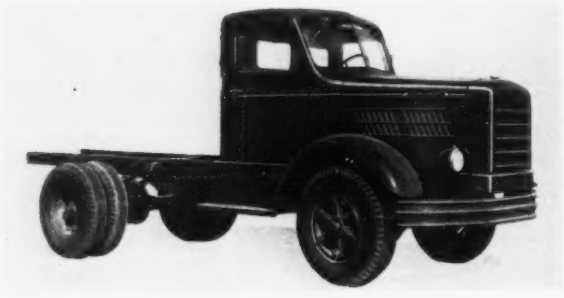
PRODUCT NEWS

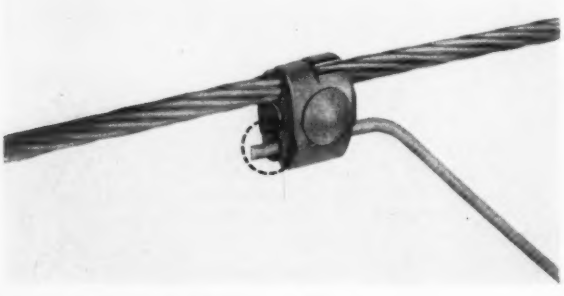


New Line of Heavy-Duty Trucks

(1) The Four Wheel Drive Auto Co., Clintonville, Wis.

Math-Matic design, claimed to produce a mathematically correct proportioning of truck weight and power between front and rear wheels, is featured in a complete new line of heavy-duty trucks. According to the manufacturer, 30 to 37% more tire life and 40 to 82% more tractive ability are secured by this design.

Other new features are Rigi-Tapered frame with deep taper design said to make the front end rigid for mounting equipment and to distribute the load over the entire frame; a larger, full-floating rear axle claimed to be 30% stronger; trunion-mounted radiator, isolated from frame by rubber; rubber-cushioned engine mountings; valve-in-head engine; diesel engine available for all models; 12-v electric system; heavy-duty steering gear with power steering optional; stirrup-action clutch and brakes with clutch hydraulically assisted and brakes power assisted.



New Design for Groove Clamp

(2) Jasper Blackburn Corp., 35 Madison St., St. Louis 6, Mo.

An improved design for its aluminum-copper parallel-groove clamp incorporates a new process that eliminates the use of solder in attaching the copper liner to the cast aluminum body, the manufacturer has announced. This process prevents development of moisture-trapping voids or fluxes between liner and body, it is stated.

The aluminum body is pressure cast around the pronged copper liner. Because the body has a greater coefficient of contraction than the pronged copper liner, it exerts great clamping forces against the prongs as the molten aluminum solidifies. This air-tight shrink fit permanently seals out moisture, the manufacturer states.

Special surface treatment of the underside of the copper liner reduces the surface tension of the molten aluminum, establishing an intimate low-resistant contact between the two metals, it is pointed out.

The aluminum body is cast of a special alloy, which has high corrosion resistance, high strength and ductility, according to the manufacturer. Steel bolt, nut and lock washer are hot dipped galvanized.

To simplify stocking, one clamp covers a wide range of conductor sizes, it is stated.

D-C Insulation Tester

(3) Line Material Co., Milwaukee 1, Wis.

A portable high-voltage d-c insulation tester has been developed for use in maintaining electrical apparatus. It utilizes the d-c leakage current principle for nondestructive testing and operates on a 115-v, 60-cycle supply, providing adjustable d-c test voltages from 1 to 15 kv. It measures d-c insulation resistance up to 30,000 megohms.

The tester has a microammeter for measuring d-c leakage current through the insulation being tested and a meter for indicating the voltage across the insulation. Two current ranges, 0 to 50 and 0 to 1,000 microamperes, are provided. A calibration curve of d-c resistance in megohms vs d-c leakage current in microamperes at 15 kv is mounted on the instrument panel.

Curves of maximum allowable conduction current vs temperature are available with the tester to indicate insulation serviceability. Safety features are incorporated in the device.

For Additional Information Fill in the Coupon on Page 64

Hold That Line!

with the HUBBARD 4-11-44 Wireholder

Smoothly rounded insulator surfaces protect insulation from damage.

Copperweld bail takes all the tension, porcelain subjected to compression only.

Heavy steel base is double-dip hot galvanized to withstand corrosion through the years.

Thread is cut clear to base, for maximum holding power in thin material.

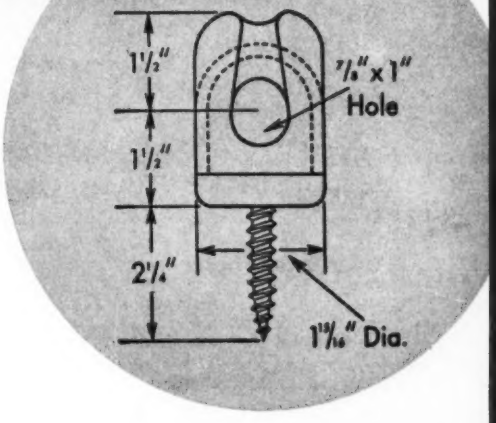
Sharp-pointed wood screw starts easily, the threads cut deep and clean.

The Hubbard 4-11-44 is the Wireholder:

- That is holding more lines than any other wireholder made.
- That holds the speed record for quick installation.
- That has a screw with the sharpest, keenest cutting threads.
- That gets the best possible grip in thin material.
- That is designed so that the Copperweld Bail takes the tension load.
- That exposes the porcelain to compression loading only.
- That is designed with smooth, large-radius insulator contours to protect insulation.

The same features are available with wood screw lengths from 2¼ to 7½-inches, and with toggle, carriage, or stud bolts. See GESCO Catalog 102WP page 911.

DETAIL DIMENSIONS



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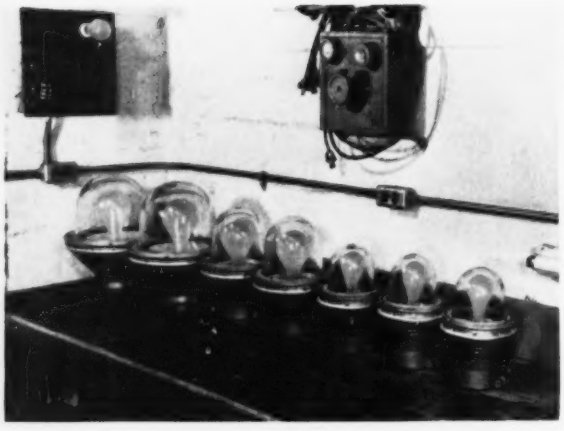


Explosion-Proof Lighting Unit

(4) Appleton Electric Co., 1701 W. Wellington, Chicago 13, Ill.

Designed to facilitate lamp exchange in hazardous locations, a standardized Unilet body fits 60- to 200-w and 300/500-w dome unit assemblies. Known as Vented AA-51, these explosion-proof fixtures are approved for all hazardous areas in Class 1, Groups C and D, the manufacturer states.

It is claimed that lighting units can be serviced in less than one minute with this unit. According to the manufacturer, a system can be set up based on one stand-by unit in stock for every ten units in service.

In servicing the proper wattage unit is selected at a glance and carrying handles facilitate installation. A five-thread safety chamber ensures that five full threads are always engaged when contact is made or broken, it is stated.

Outlet Box Gripper

(5) All-Steel Equipment Inc., Aurora, Ill.

It is claimed that electrical outlet boxes can be installed in 47 seconds with this new Raco gripper designed to clamp any standard-size box to any type of wall. Installation requires two grippers. The gripper is laid on the box, its lugs are bent over the box end and tabs are bent forward. The box is then inserted in the wall and gripper tabs are pulled up. These grippers can be used on any single or multiple wall box, the manufacturer states.

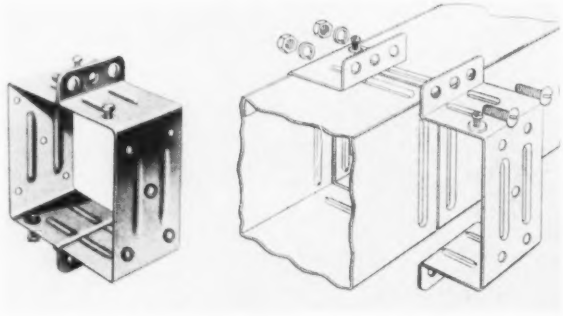
Insulating Varnish

(6) General Electric Co., Chemical Materials Department, Pittsfield, Mass.

For manufacturers of heavy electrical equipment, a new clear baking organic varnish is claimed to offer high bonding strength with flexibility and long life at Class B temperatures and above. Designated G-E 9615, the new material is said to bond as well to electrical components, Mylar and silicone-glass insulations as do ordinary phenolic varnishes. According to the manufacturer, field tests have proved it suitable in all respects as a tough, flexible insulation on coils operating continuously at 150 C and for short periods at 175 C.

It was developed for aircraft generators and transformers, motor generators, traction and induction motors and other heavy-duty equipment with insulation temperature requirements greater than Class A. It is also suggested by the manufacturer as the binder for cotton or glass served wire and as a finish coat over conventional Class H insulation to improve the bond, facilitate cleaning and provide additional moisture protection.

Besides having heat resistance reaching into the lower ranges of Class H operating temperatures, it retains all advantages of conventional oil-phenolic varnishes, according to the manufacturer. It has a dielectric strength of 1,200 v per mil wet and 2,200 v per mil dry. It can be cured in one hour at 150 C and exhibits resistance to chemicals, oil and salt water.



Coupling for Joining Wireway Sections

(7) National Electric Products Corp., Pittsburgh, Pa.

A two-piece, squeeze-type coupling for joining lengths of Wirewa has been introduced. The 4x4-in. electrical raceway sections of 1-, 2- and 5-ft lengths have hinged covers for accessibility, with a 1¼-in. solid ridged enclosure at each end. The new 16-gage pressed steel coupling, 2½ in. wide, is also ridged to key into the individual wireway sections and assure perfect alignment, the manufacturer states.

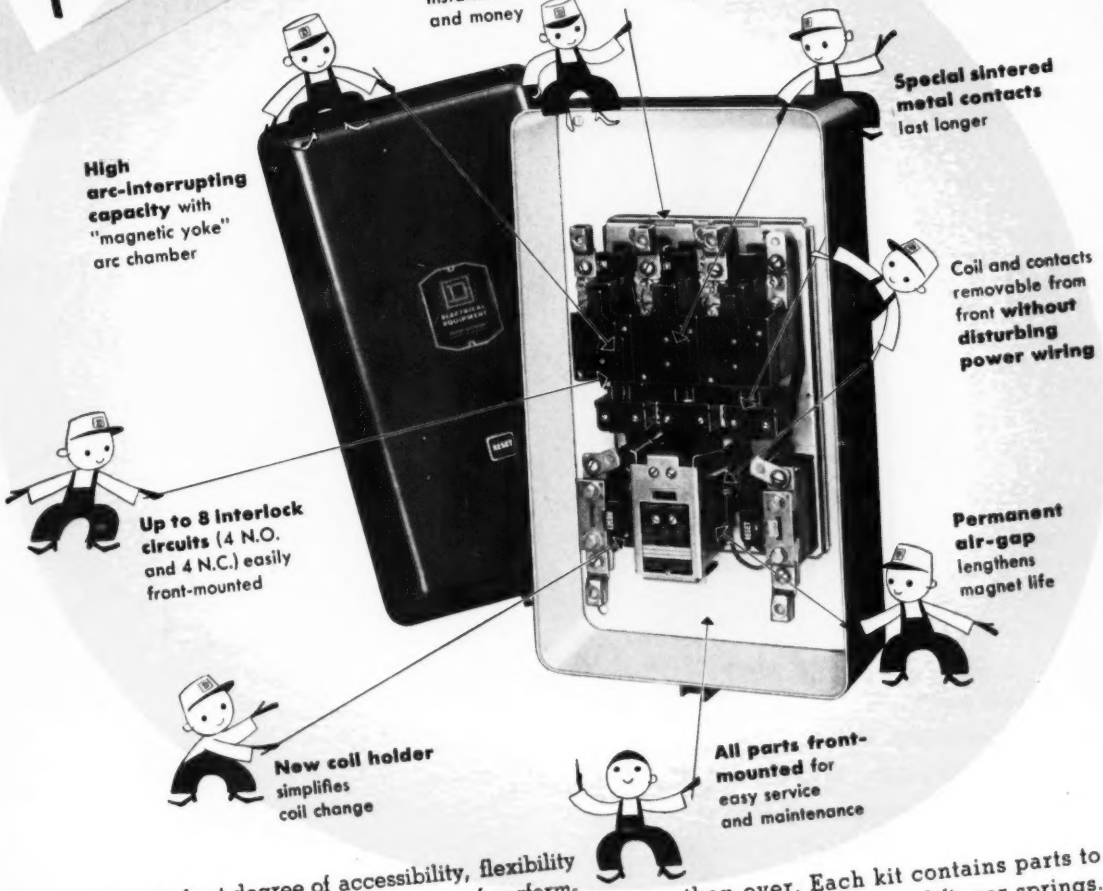
The two-piece coupling, catalog 544-CS, has identical forms so that it will close over the square wireway end sections. Four cadmium-plated round head bolts with lock washers and hex nuts give quick permanent grip and two self-imbedding screws are installed with each coupling to maintain continuity of ground. A third hole in each coupling side may be engaged as a hanger support for the raceway, eliminating the need for special supports.

Developed for use where several wireway sections are preassembled, the new coupling gives complete rigidity so that sections can be lifted into place as a unit. It permits flush wall mounting of the raceway through five ¼-in. diameter holes predrilled in each side.

See Coupon on Page 64
For manufacturer's bulletins on these products, fill in and mail the coupon on page 64.

NEW Square D Size 4 Starter

Feature-packed!


"Hook-on" base design saves installation time and money
Special sintered metal contacts last longer
High arc-interrupting capacity with "magnetic yoke" arc chamber
Coil and contacts removable from front without disturbing power wiring
Up to 8 interlock circuits (4 N.O. and 4 N.C.) easily front-mounted
Permanent air-gap lengthens magnet life
New coil holder simplifies coil change
All parts front-mounted for easy service and maintenance

The highest degree of accessibility, flexibility and compactness—with no sacrifice of performance and long life. That's Square D balanced design—and you'll find it in every size Square D starter.

"Off-the-Shelf" Parts Kits, another Square D convenience feature, make normal maintenance easier than ever. Each kit contains parts to replace all load contacts and finger springs. Electrical interlocks also available in kit form.

Write for Bulletin 8536, Square D Company, 4335 Valley Boulevard, Los Angeles 32, Calif.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

1903 · 50 YEARS OF DESIGN LEADERSHIP · 1953

Watch for Square D's Display Coach—Now on Tour!

Here's the Simplest, Safest Way to By-Pass Voltage Regulators

the New Improved KEARNEY ONE PULL

CAT. NO. 10294-1
200 Amp. 7.5 KV

CLOSED TYPE ... Available in 100 ampere 7.5 KV and 200 ampere 7.5 KV. Features: Wet process porcelain housing; Bakelite door; bus bar copper blades with ceramic spacers; heavy bronze terminals are plated for use with all types of line wire from No. 6 sol. to 2/0 str.; auxiliary arc extinguishing switch is optional equipment. Complete with hanger for all crossarms from 3¼" x 4¼" to 4" x 5". Surge protector should be used with this equipment.

- by-passes the regulator
- opens both regulator leads
- interrupts the exciting current

Specify KEARNEY

All Danger Eliminated

The fool-proof, automatic switching sequence of this new, improved KEARNEY By-Pass Disconnect Switch eliminates all danger of load dropping. Even more important, the exciting current is automatically interrupted for complete safety. This closely coordinated make-before-break design allows the regulator to be isolated without load disturbance or arcing at the contacts.

Naturally, you save money in construction with the improved KEARNEY By-Pass Disconnect Switch. It does the job that formerly required three disconnect switches. You save switchgear expense, installation costs and substation space.

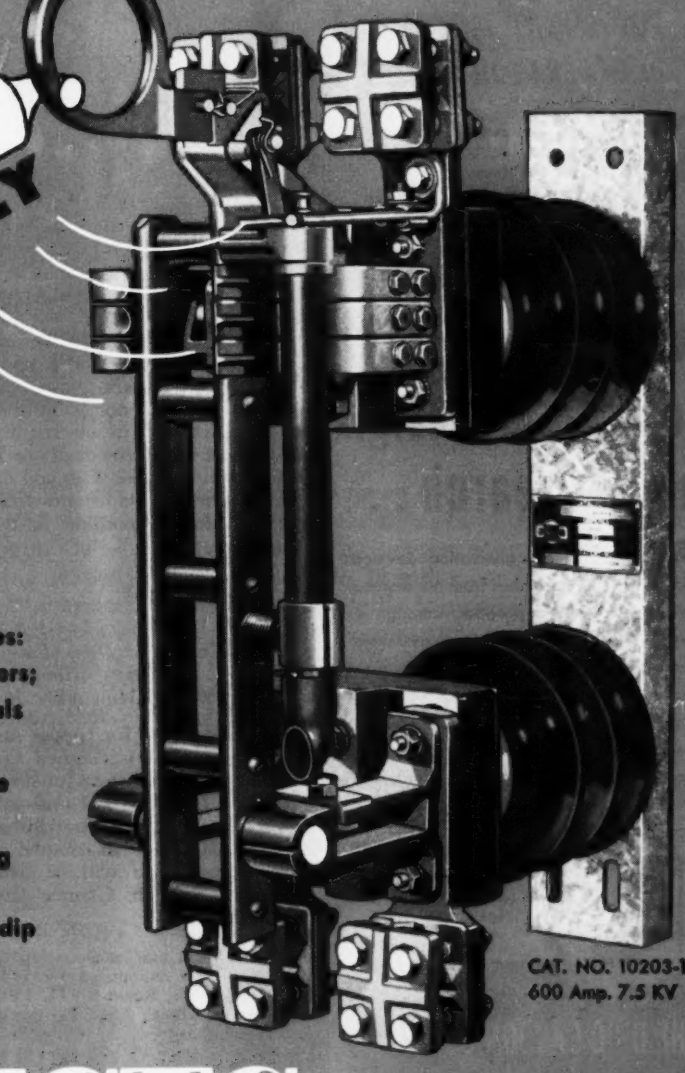
for full information and prices ask your KEARNEY man, or write

MAYDWELL & HARTZELL, *INCORPORATED*
WEST COAST DISTRIBUTORS
Los Angeles • San Francisco • Portland • Seattle • Spokane • Phoenix

JAMES R. KEARNEY CORPORATION
4224-42 CLAYTON AVE., ST. LOUIS 10, MISSOURI
Canadian Plant: Guelph, Ontario

BY-PASS DISCONNECT SWITCH AUTOMATICALLY

The Mark of JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. *Quality Products*



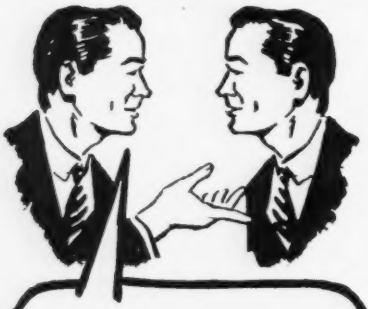
OPEN TYPE . . . Available in four current ratings: 200, 400, 600 and 1200 amperes. Voltage ratings: 7,500, 15,000. Precision construction throughout. Features: Bus bar copper blades with ceramic spacers; shoe type contacts; heavy bronze terminals are plated for all types of line wire from No. 4 sol. to ¾" IPS copper (1200 ampere model terminals are to customers' specifications); auxiliary arc extinguishing switch is optional equipment; 3-inch bolt circle insulators are NEMA standard; hot dip galvanized channel base. Surge protector should be used with this switch.

CAT. NO. 10203-1
600 Amp. 7.5 KV

PRODUCTS

For Better Construction . . . Safer Maintenance

DID YOU EVER ASK YOURSELF



WHAT MAKES A TOP FLIGHT MOTOR or GENERATOR BRUSH?

THE ANSWER IS SIMPLE...

Here at OHIO we "Add a Bit More" to Service, Design and Research . . .

Basically our organization develops and manufactures brushes from the raw material to the finished product. Although we carry standard items in stock, we also maintain a complete engineering staff to assist you in the selection and application of correct brushes for your equipment. We base our 35 years of reputable existence upon our SERVICE to INDUSTRY. Try Ohio for your brush requirements.

ORDER YOUR CARBON BRUSHES FROM A SINGLE SOURCE

West Coast Representative
C. F. BOWERS
544 S. San Pedro St.
Los Angeles 13, Cal.

THE OHIO CARBON COMPANY
12508 BEREA ROAD • CLEVELAND 11, OHIO

Electronic Relay

(8) Mullenbach Electrical Mfg. Co., 2300 E. 27th St., Los Angeles 58, Calif.

The Capaswitch is basically an ultrasensitive nonmagnetic d-c relay with unusual current carrying capacity, according to its manufacturer.

A new operating principle is used to give the mechanical energy to open and close the contacts. Instead of the conventional electromagnetic armature, the new device uses an electrostrictive capacitive element, requiring .5 milliwatt-seconds of operating power to close the contacts and less than .1 milliwatt to hold them closed. The element may be used also to store minute amounts of energy from a low-energy source until enough has been accumulated to operate the relay, it is pointed out.

To open the contacts, the voltage is removed and the electrostatic element is discharged through other circuit elements or a resistor.

The low operating power requirement permits the small current from a photo tube to operate the relay directly without use of an intermediate amplifier tube, according to the manufacturer. It also permits an extremely sensitive photo-multiplier-type radioactive radiation detector to be built, whereby almost zero stand-by current would be consumed.

Input resistance of the electrostatic element is approximately 100 megohms. The Capaswitch has a normal closing delay of about 10 milliseconds but it is actuated by electrical pulses as short as 10 microseconds or less, it is stated. Since there is no coil to burn out, the unit will withstand wide voltage variations, according to the announcement.

Cutter

(9) Interstate Drop Forge Co., Special Products Division, 4051 N. 27th St., Milwaukee 16, Wis.

A presplice cutter for copper and all-aluminum strand is claimed to leave the wire round and clean for easy splice insertion. This tool has hickory handles for working lines hot up to 4/0 capacity. It will be distributed by the manufacturer and will be available through the A. B. Chance Co. and its distributors.

(10) REEL—A bracket-mounting Port-O-Reel has been announced by Industrial Electrical Works, Room B 171, 1503 Chicago St., Omaha 2, Neb. This reel is attached to chassis or handle of portable power equipment; has a built-in collector ring permitting continuous flow of electrical current as the reel is turned. Reels hold up to 150 ft of No. 16-2 conductor cord.

Time Switch

(11) Sangamo Electric Co., Springfield, Ill.

This time switch for the low-price field is a NEMA standard 30-amp single-pole, single-throw unit employing the same slow-speed hysteresis motor and synchronous timing mechanism used in the manufacturer's heavy-duty line. The entire mechanism is enclosed in a sturdy grey steel case with a hinged cover and sealable hasp.

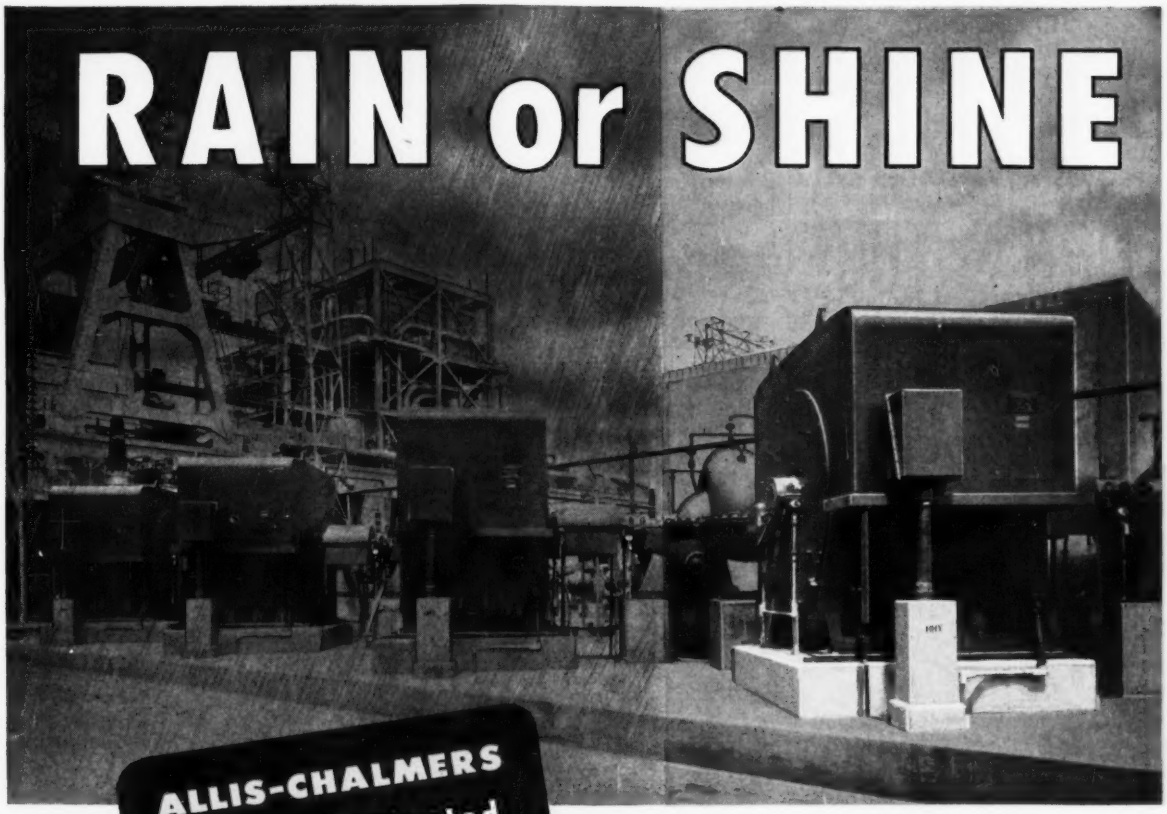
The switch measures 4¼x7¼x3⅛ in. over-all. According to the manufacturer, there is ample space for wiring; four convenient multiple knockouts and a keyhole mounting slot are provided. Heavy silver contacts, insulating safety shield, four levers for two on and off operations and easily manipulated trippers are other features. Catalog sheet 1020 gives details.

(12) CORONA TEST SETS — Test sets consisting of a control unit, a detector unit and a high-voltage corona-free testing transformer incorporating means for picking up corona signals from the equipment under test is available from the James G. Biddle Co., 1316 Arch St., Philadelphia 7. Model 1 is rated .75 kva, 20 kv continuously or 1.5 kva for intermittent duty. It comes also with a larger control unit with a rating of 2 kva continuous and 5 kva intermittent duty. Model 2 is rated up to 10 kva, 35 kv continuous or 20 kv intermittent duty. Details in bulletin 66-11.

(13) VOLTAGE TESTER—A tester that will show nominal line voltages from 110 to 550 a-c and 110 to 600 d-c and will distinguish between a-c and d-c and show polarity of d-c lines has been announced by Ideal Industries Inc., 1042 Park Ave., Sycamore, Ill.

(14) CABLE FAULT FINDER — No. CFF-1 cable fault finder made by Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa., is designed primarily for locating faults in rubber and synthetic jacketed cable. It is portable and no complicated calculations or technical training are required to operate it, the manufacturer states.

RAIN or SHINE



ALLIS-CHALMERS
Weather-Protected MOTORS

Low-cost outdoor installation plus dependable operation under all weather conditions

Economy plus reliability — regardless of weather conditions — was the combination demanded by Southern California Edison for the circulating water pump motors at the 250,000-kw Etiwanda Steam Station. And that's the combination delivered by the four Allis-Chalmers motors shown above.

Each of these modern weather-protected squirrel-cage motors is rated 900 hp, 4160 volts, 435 rpm. Smaller motors of similar design were supplied by A-C for the station's condensate booster pumps.

Proved by Special Tests

The weather-protected design has been tested under extreme conditions. Running at normal speed and voltage, motors of this type were deluged with water at rates up to 40 inches per hour — driven by winds up to 75 miles per hour. This was done repeatedly from all angles, but on inspection no moisture was detected on the windings. And other tests checked effectiveness in keeping out wind-driven fine sand — a serious threat at this west coast installation.

Movie and Bulletin Available

See how A-C test-proved these motors. Ask your A-C representative to show you the 12-minute movie *The Sky is the Roof*. Or write for Bulletin 05B7874. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4176

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

CALIFORNIA

EARTHQUAKE

PROVES ADVANTAGES OF

KNOB & TUBE WIRING

Earthquakes only serve to **emphasize** the many advantages of Knob and Tube Wiring. In a recent California earthquake a large new building had to be closed because of damage to the wiring system. In contrast inspectors reported old knob and tube wiring, which was some of the oldest in the state and located in the hottest attics, survived without causing a single fire or other damage. Inspectors, Contractors, Engineers and Code have long recognized the superiority of Knob and Tube Wiring in safety, in load carrying capacity and economy. Knob and Tube Wiring with plenty of copper is **the** answer to the need for adequate wiring. Your nearest Porcelain Products west coast representative listed below will be glad to supply further information

WESTERN REPRESENTATIVES

LOS ANGELES . . . **Allied Industries** 412 Seaton Street
SAN FRANCISCO . **Geo. A. Gray Company** 2720 - 17th Street
SEATTLE . . . . . **Mr. E. A. Will** 534 First Ave., South
SALT LAKE CITY . . **Mr. Leonard M. Slusser** 318 Dooly Block
ALBUQUERQUE . . **Gordon W. Laursen & Son** 512 W. Granite
DENVER . . . . . **Harvey M. Olmstead Co.** 3755 Blake Street

Porcelain Products, Inc.
FINDLAY, OHIO

Tubing

(15) Bentley, Harris Mfg. Co., Conshohocken, Pa.

Braided Fiberglas tubing and sleeving for electrical insulation claimed to withstand continuous operating temperatures of 130 C is a revised formulation of the manufacturer's BH 649. A new combination of vinyl-chloride and plasticizers produces a high dielectric film, it is stated. Applied over heat-treated, braided Fiberglas, it gives permanent flexibility with maximum heat stability and resistance to flow, according to the manufacturer.

Supporting braid can be treated against capillarity to water. Fungus inhibitors also can be added.

The new BH 649 is available in sizes to fit A.W.G. bare wire from No. 24 to 6/0 in black, yellow, red, green, blue, brown, grey, orange and purple. On special order it can be made up to 2 in. in diameter, the manufacturer reports.

Stage Switchboard

(16) Kelek Co., Norwood, Mass.

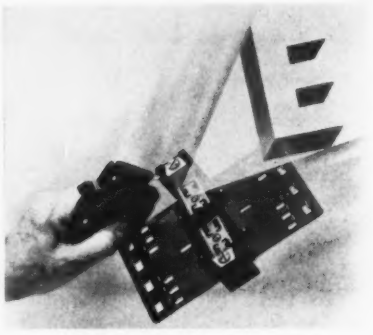
An interlocked stage switchboard is designed for operation on three-phase, four-wire or single-phase a-c systems. Built on a freestanding, rigid-angle iron framework, this switchboard permits both individual and gang operation. All front panels are stretcher leveled, steel formed, with 1-in. return on all sides. A continuous lighting trough across the top of the front provides adequate light for the operator, the manufacturer states.

Dimmers are individual units of the variable-voltage autotransformer type. Stage section blackout is controlled by a manually operated dead-front, quick-make, quick-break disconnect switch. House section is controlled by a magnetically operated, mechanically held contactor operated by push-button control. Safety devices are included for protection of all internal and external wiring, it is stated.

Transformer

(17) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

Type CSPH-K constant-current transformer for cascade service in street and highway lighting systems is an oil-insulated, self-cooled, automatically controlled unit. It is claimed to prevent the current from varying more than 1% from its rated value under all conditions of loading within rated capacity. The transformer comes in ratings from 5 to 30 kw, 2,400-4,800 v primary, 6.6 or 20 amp secondary, 60 cycles. Special ratings can be provided.



Circuit Breaker

(18) Federal Electric Products Co., 50 Paris St., Newark 5, N. J.

This new type NC Stab-lok circuit breaker comes in 15 and 20 amp. According to the manufacturer, its slim construction permits two breakers to be stabbed in where only one would fit before.

Another feature is the new Magic E design of slots in the enclosure bus bars. These slots can take two of the single-pole type NC Stab-loks in each E slot; type NQS, 1, 2 and 3 poles, 15-50 amp; type NA single pole, 15-50 amp; the simultaneous-trip double-pole type NA, 15-50 amp. The new design entails no obsolescence to existing stock, the manufacturer states.

Other design features include tease-proof, quick-make, vibration-dampened action to guard against undue contact wear; resilient pivot pin for wiping contact action; ambient temperature compensation. Thermalmagnetic action passes harmless momentary overloads but in event of short circuits or dangerous overloads the circuit is broken instantly, it is pointed out.

Converter

(19) Motorola, Communications & Electronics Division, 4545 W. Augusta Blvd., Chicago, Ill.

Two small 12- to 6-v converter units have been designed to prevent obsolescence of 6-v mobile two-way radio units when 12-v automotive equipment is purchased. One converter is capable of supplying from 10 to 50 amp; the other from 10 to 30 amp. Both units are claimed to have conversion efficiencies of more than 80%. They may be mounted in the automobile trunk or under the instrument panel. Over-all dimensions are 7x9¼x 6¾ in.

For Coupon and More Bulletins, See Page 64

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT Calol O.H.T. Grease

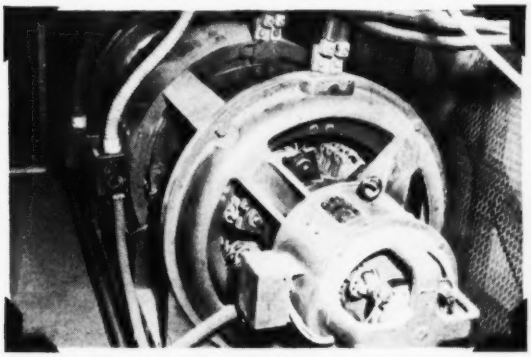
UNITS Electric motor bearings—fractional to 100 H.P.

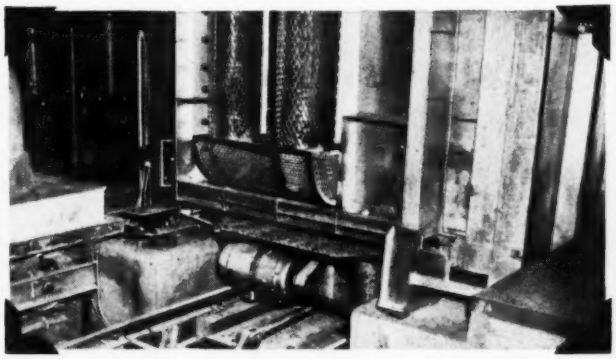
OPERATION Machine tools, furnaces, generators

CONDITIONS High ambient temperatures

FIRM Ryan Aeronautical Company, San Diego, Calif.

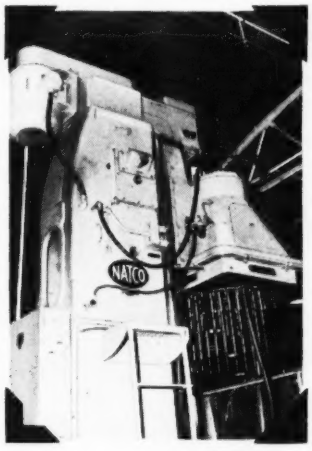
Special grease ups lubrication period to 5 years!



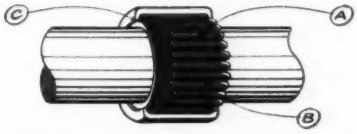


1900 MOTORS, from this 100 H.P. motor-generator set to fractional H.P. units, are lubricated on a 5-year-interval schedule with Calol OHT Grease in the Ryan Aeronautical Company plant, San Diego, Calif. All grease gun fittings were removed after tests proved this special grease efficient in motors under exceptionally high ambient temperatures. The motor above is constantly in temperatures of 150°F. plus. It operates doors, and cars, loaded with jet-engine afterburners, for this heat-treating furnace.

CALOL O.H.T. GREASE also lubricates many motors for Ryan that operate under heavy loads, such as this 25 H.P. motor which runs the specially-designed 42-spindle multiple drill shown at right. Sealed in bearings, it has ended motor repairs brought about in the past in the Ryan plant by overlubrication and occasional missing of a fitting. This special grease is recommended for all types of bearings.



How Calol O.H.T. Grease protects bearings in severest operating conditions



Used in any type of bearing under any operating condition, high temperature-low speed, high speeds to 10,000 rpm, temperatures from minus 10°F. to 400°F., Calol O.H.T. Grease will last indefinitely.

A. Contains special oxidation inhibitor—helps prevent rusting, corrosion, hardening of grease at any time.

B. Resists high temperatures—eliminates coking and formation of deposits.

C. Provides excellent seal against water ...lubricates efficiently in slight moisture.

FREE CATALOG: "How to Save Money on Equipment Operation", a booklet full of valuable information, is ready for you. Write or ask for your free copy today.

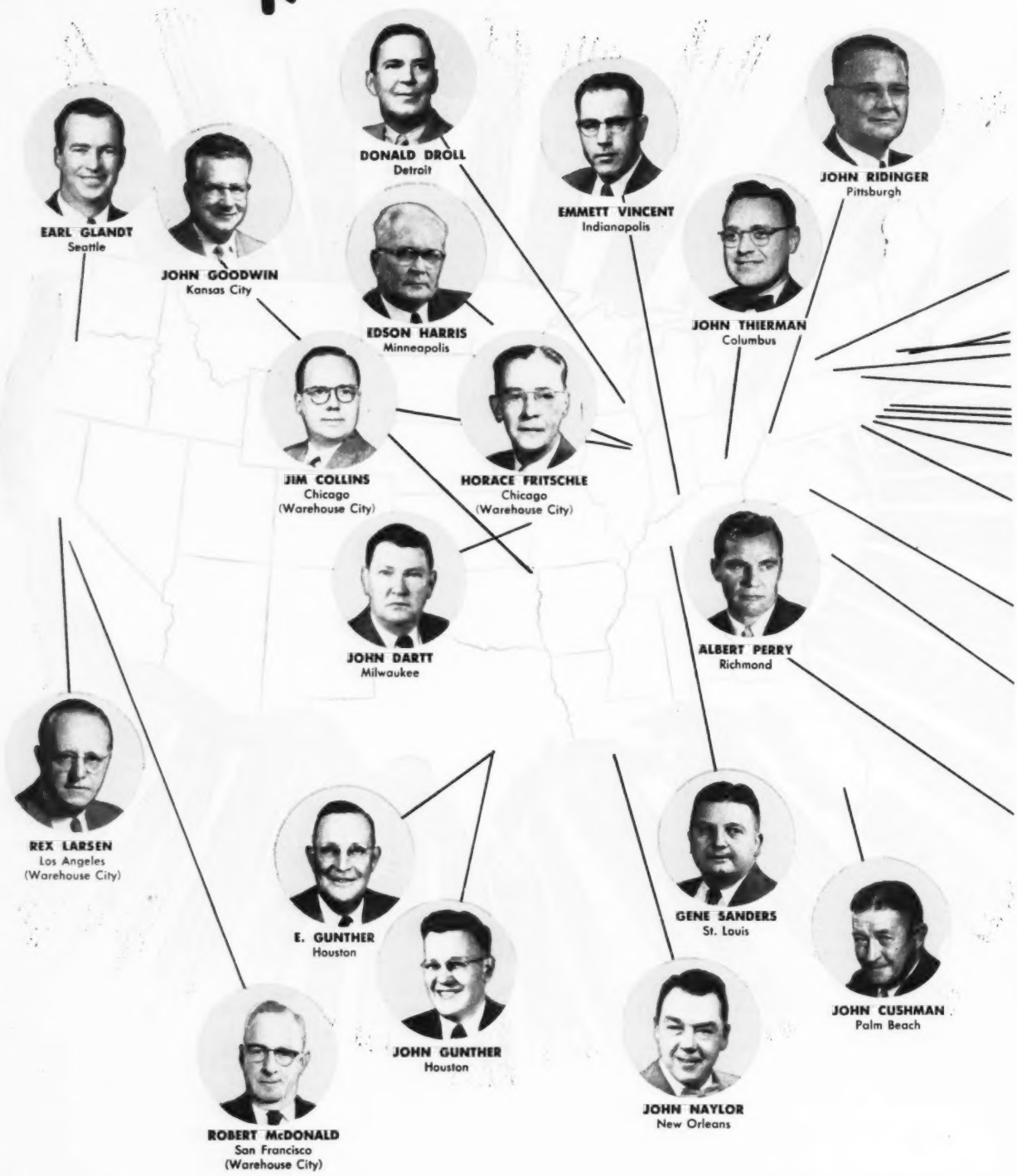
CALOL

TRADEMARK "CALOL" REG. U.S. PAT. OFF.

STANDARD TECHNICAL SERVICE checked this product performance. For expert help on lubrication or fuel problems, call your Standard Fuel and Lubricant Engineer or Representative; or write Standard Oil Company of California, 225 Bush St., San Francisco.

STANDARD OIL COMPANY OF CALIFORNIA

THESE 31 *Triangle* REPRESENTATIVES



ALL HAVE THE SAME MIDDLE NAME-

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EDWARD COOK, JR.
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ROBERT DUCKWITZ
Philadelphia

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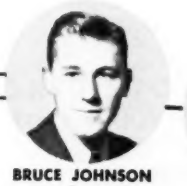
Babylon



BRUCE JOHNSON
New Brunswick

AL WALKER
New Brunswick

EUGENE CROSS
Philadelphia

PAUL KIDDER
Baltimore

JOHN CUSHMAN, JR.
Charlotte
(Warehouse City)

MICHAEL WELCH
Atlanta

These Triangle Sales Representatives have a responsibility to you. They all are dedicated to one aim—to serve you better, quicker and in a more friendly way than you ever thought possible. Cooperation, sincerity and honesty come first on their list of "musts."

These men are backed by a manufacturing organization that has grown, since 1916, from a one story building to an imposing array of four large factories. Starting as a manufacturer of Armored Cable and Flexible Steel Conduit, Triangle today is one of the foremost manufacturers of electrical wire, cable and conduit. In addition to the electrical field, Triangle is now producing plastic pipe, brass and copper tube for the plumbing and heating industry, plus numerous other applications. We at Triangle believe the contributing factors to this growth have been the extra quality of our service and products along with our 100% distributor policy. Service, coupled with our directive to our employees that our products *must be right*, have been the keystones of our business policies.

If you distribute, buy, specify or install wire, cable, conduit, plastic pipe or brass and copper tube, it will pay you to ask for TRIANGLE.

TRIANGLE CONDUIT & CABLE CO., INC.

NEW BRUNSWICK, NEW JERSEY

Manufacturers of arteries for **electricity, liquids and gases.**

Wire · Cable · Conduit · Plastic Pipe · Brass and Copper Tube

PLANTS—NEW BRUNSWICK, N. J.:

Wire and Cable Plant · Rod Mill · Brass and Copper Tube Mill · Plastic Pipe Plant

MOUNDSVILLE, W. VA.: Conduit Plant

TRIANGLE

It Must Be Right

SAVES BOTH CIRCUIT *AND* CUSTOMER
(FOR 120/208 VOLT AC OR 125/250 VOLT DC NETWORKS)

POSITIVE PROTECTION AGAINST SUPERCURRENTS

Low voltage AC and DC networks give large utilities and their customers greater continuity of service and easy expansion of their systems. The only drawback to this type of network is the constant threat of danger from heavy short-circuit or fault currents. Shawmut's new FORM 208 Amp-trap eliminates this danger from these circuits. On actual test, its amazingly fast "chop-off" stops a short-circuit *even before it reaches the peak of its first ¼ cycle — even if the available peak current could reach* 560,000 *Amps!* It anticipates and prevents the destructive build-up of heavy fault currents so dangerous to office buildings, stores, hospitals, theatres, schools, etc. FORM 208 saves *both* circuit and customers.

USES & SPECIFICATIONS

Amp-trap FORM 208 is made for Entrance Switch Service, Underground Network Conductors, Distribution & Panelboards and other applications. It is built in Ampere ratings of 1000, 1200, 1600, 2000, 2500, 3000, 4000 and 5000 for Entrance Switch Service and for cable sizes from 4/0 to 1000 MCM. It runs "cool" and carries 100% of its rating with temperature rises less than those recommended in the Underwriters' Laboratories Standards for Fuses. The watt (power) loss is probably lower than for *any other over-current protective device*. Hence it may safely be installed in vaults and steel enclosures and subjected to long continued loads.

LOW IN COST — EASY TO INSTALL

FORM 208 Amp-traps clear fault currents long before they can burn or wreck bus bars and switch gear. Yet they are small in size, low in cost and easy to apply. They have a variety of mountings for flat, bus or tubular connectors. Adapters can be supplied for switch cubicles now equipped with copper or aluminum alloy links. FORM 208 is the "little brother" of the famous FORM 600 Amp-trap which has long been used so successfully on 600 volt circuits. Write today and find out about FORM 208 at once.

208
WITH TUBULAR TERMINALS

Copyright 1953 The Chase-Shawmut Co.

OUR 60 IN YEARS — FROM EDISON TO ELECTRONICS

208 AMP-TRAP — "Awake At The Switch"

THE **CHASE-SHAWMUT** CO.

385 MERRIMAC STREET • NEWBURYPORT, MASSACHUSETTS

Resistor

(20) I-T-E Circuit Breaker Co., Resistor Division, 1924 Hamilton St., Philadelphia 30, Pa.

A sub-miniature resistor, type A3606CG is 3/16 in. in diameter and 1⅛ in. long. These units are built to customers' specifications, rated at 0.10 w. Maximum resistance, using Evenohm wire or its equivalent, is 500,000 ohms. Tolerances down to 0.1% are standard. Axial lead wires are of 22-gage tinned copper, 1½ in. long.

Yard Light

(21) Abolite Lighting Division, Jones Metal Products Co., West Lafayette, Ohio

Designed for a variety of outdoor lighting applications, this Yardlite mounts on vertical surfaces and is supplied complete with reflector, socket, socket holder, pipe bracket, wall fitting and insulators.

The de luxe model features an inside surface finished in white titanium porcelain enamel for maximum light reflection. The standard model comes in special Permagloss baked enamel finish. It is claimed that the unit is easy to assemble and install.

Any standard lamp may be used, depending on lighting requirements. Two reflector sizes are available: 12-in.-diameter reflector for 60- to 100-w lamps and 14-in.-diameter reflector for 150-w lamps.

Fixture Has Plug-In Feature

(22) Gibson Mfg. Co., 1919 Piedmont Circle, N.E., Atlanta, Ga.

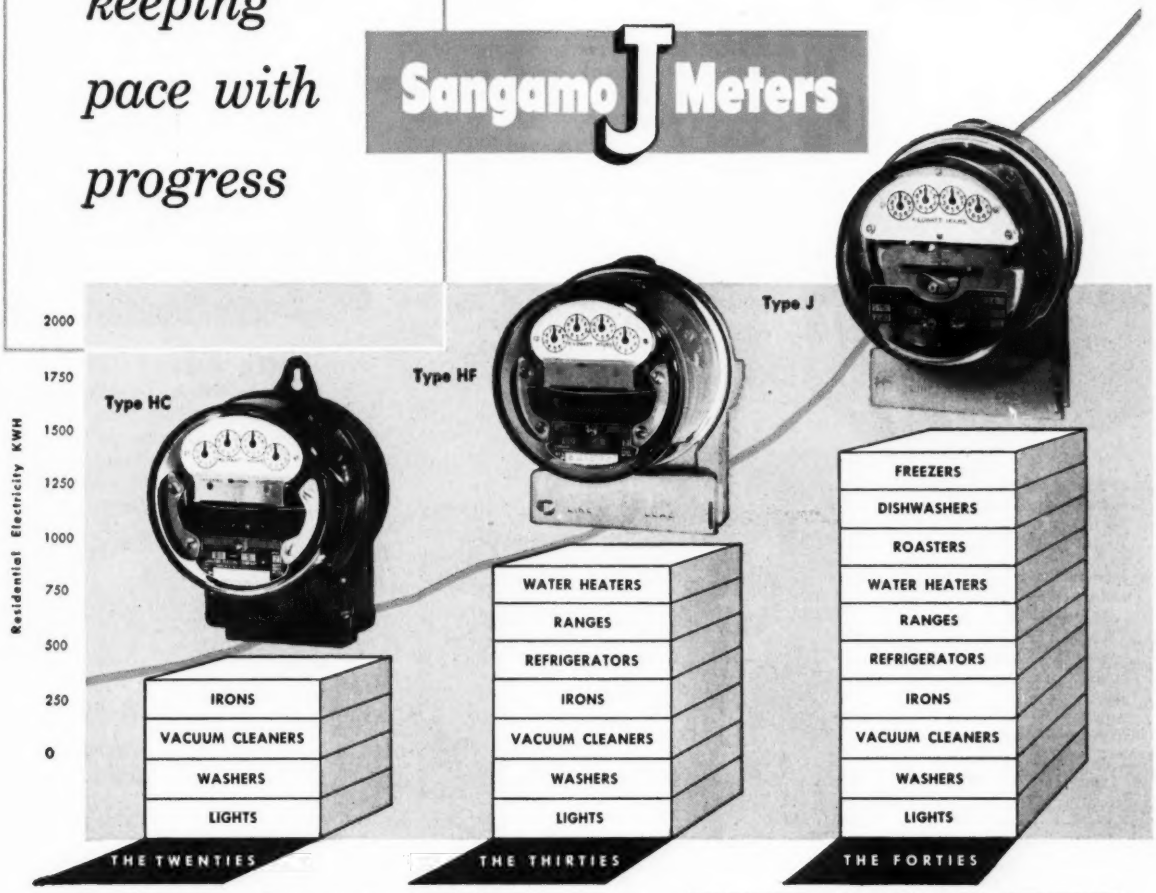
The Ortho-77 fixture is designed to be mounted on Uni-Race, a rigid sectional channel. Receptacles are wired in at spaced intervals and clamped into preset slots. A plug-in socket in the fixture makes contact with the receptacle when the fixture is closed. It becomes completely dead when opened, the manufacturer states, and, being wired in parallel circuits, does not disturb other fixtures when removed.

(23) HOLIDAY LIGHTING—Two packaged holiday lighting kits have been added by Steber Mfg. Co., Broadview, Ill. No. 2-K consists of the No. 2 Utilite taking PAR-38 or R-40 sealed-beam lamps, a lens holder for the colored lens and a steel spike for mounting in the ground. No. 2-KL has the same items plus a PAR-38, 150-w sealed-beam flood lamp. Kits come with amber, blue, green or red lens.

(24) CONNECTOR — A screw-on wire connector with one-piece plastic threads and body has been announced by Ideal Industries Inc., 1042 Park Ave., Sycamore, Ill. It is designed for Nos. 14, 16 and 18 wire and comes in two sizes, A-1 and A-3.

keeping pace with progress

Sangamo J Meters

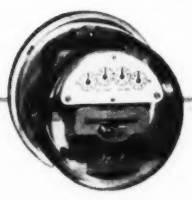


In the 1920's, the concept of a full-use customer was one with lights, an iron, and a vacuum cleaner. Today, the full-use customer has a range, water heater and many other major appliances.

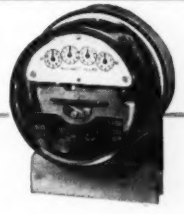
Through these years, Sangamo Meters have been adequately measuring these growing loads. Since 1940, the Type J has provided completely accurate measurement of large domestic loads as well as the loads of the small-use customer.

J Meters have met all requirements of the customer, the utility company and the meter superintendent. They have measured with great accuracy—have required little maintenance—and they have been easy to test and to repair.

SANGAMO
ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS



Only Measured Facts are Known Facts



IF IT'S WIRE TRI-STATE HAS IT

Everything you need in wire is within telephone reach. One call for all the top manufacturers' brands. By the foot, by the spool or by the carload—the *right* wire for *your* job. Immediate delivery from complete warehouse stocks. Call TRI-STATE.

If you have wire problems call TRI-STATE for a prompt solution.

Make TRI-STATE your "one-call" headquarters for the nation's finest electrical, electronic and industrial supplies—***from wire—to electrical insulation—to electrical winding equipment.***

ONE CALL FOR ALL TOP BRANDS!

ANACONDA

ANACONDA WIRE AND CABLE CO.
Magnet Wire—all sizes (round, rectangular, square), all types and insulations.

Belden

BELDEN MANUFACTURING CO.
Lead-in, Aircraft, Shunt Wire, Cable, Braided Straps—all sizes and types.

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CONTINENTAL WIRE & CABLE CO.
Asbestos and Fiberglas Insulated Wire, Cord, and Cable—all sizes and types.

USS AMERICAN

AMERICAN STEEL & WIRE COMPANY
Tinned Steel Armature Banding Wire—all sizes and strengths.

Call or write for detailed specification catalogs.

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SEATTLE 4 • 318 Occidental Avenue Main 4161

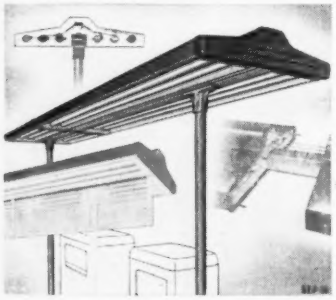
Hand Lamp

(25) Crouse-Hinds Co., 7th North St., Syracuse, N. Y.

An explosion-proof raintight hand lamp weighing less than 5 lb is about half the size of previous lamps of its type. Globe guard, holder and cord connector housing are of aluminum; lamp receptacle housing is of lightweight molded phenolic composition and lamp handle is phenolic bone fiber.

The lamp is claimed to have much higher impact-resisting qualities. Its globe is seated firmly against a metal flange by a heat and impact-resistant guard. Tests have shown that the globe cannot loosen, even under severe shock, and that the lamp meets the code's four-to-one safety factor, the manufacturer states.

The fixture takes a standard 100-w A-21 rough-service lamp.



Pump Island Lighting

(26) Benjamin Electric Mfg. Co., Des Plaines, Ill.

A new fluorescent lighting system for service station pump islands and similar locations is called Teelon. A type of sliding construction is said to make it possible to adjust the system to any pole spacing, making it possible to utilize existing poles.

The units come in 4- and 8-ft sections that may be combined into units as long as 16 ft. One pole is needed for 4- to 8-ft lengths; two poles for lengths over 8 ft.

The manufacturer's Springlox lampholder has been redesigned with a feature making relamping faster, it is reported.

Units have one-piece, weatherproof housing, simplified wiring and rugged support channel, the manufacturer states. There is a choice of five colors in addition to the standard green reflector finish. Available on request are red, white, blue, yellow or cream.

Fill in Coupon on Page 64

(27) METER SOCKET CINCHER—This device was designed to simplify socket meter installations and eliminate pounding. The meter is secured firmly and quickly by snapping a locking device into place, according to F. D. Kees Mfg. Co., Beatrice, Neb., who developed the installation tool

Capacitor

(28) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

A newly introduced 15-kvar, 230-v capacitor comes in three styles: three-phase indoor, single-phase outdoor and three-phase outdoor.

According to its manufacturer, the unit is especially suited for outdoor use on secondary circuits and on secondary networks where it delivers 13.3 kvar at 216 v. Where multiples of 15 kvar are needed for outdoor use on pole mountings, the capacitors may be mounted in the standard one-, two- and four-unit brackets. The capacitor is available also for indoor use in dust-tight and rack-type equipment.

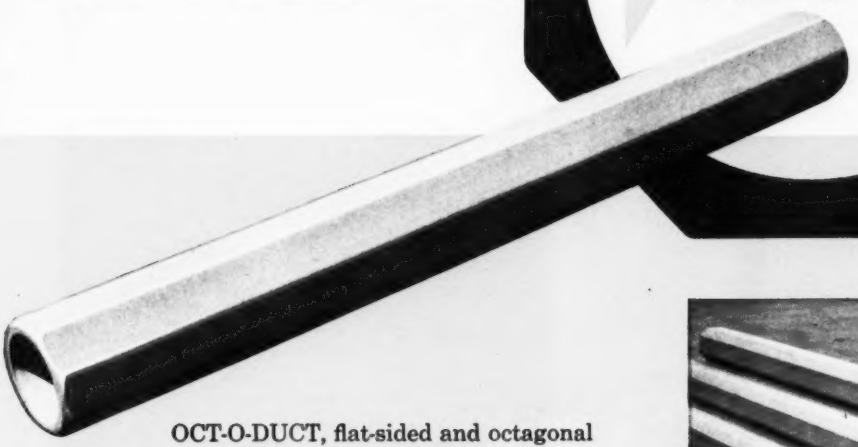
Capacity has been doubled over the previous 230-v size but dimensions and weight have been increased only slightly, it is stated. The unit weighs 76 lb and is 6 in. wide, 17½ in. high and 17 in. long.

(29) INSULATION—A new grade of sheet mica insulation can be stored twice as long as ordinary bonded mica products and has the advantages of extreme flexibility and low-binder content, according to its manufacturer, General Electric Co., Laminated and Insulating Products Department, Pittsfield, Mass. It was developed for motors and generators operating up to 150 C; is designated G-E 77520 flexible sheet mica.

(30) LINE FAULT ANALYZER—Sierra model 124 analyzer is said to locate power line faults at ranges from ½ to 200 miles. It is a direct-reading instrument and tests may be made phase to phase or phase to ground. It is simple to operate, is light weight, weatherproof and portable, according to the manufacturer, Sierra Electronic Corp., San Carlos 2, Calif.

Engineered for better circuit protection to save you money

New SOAPSTONE OCT-O-DUCT



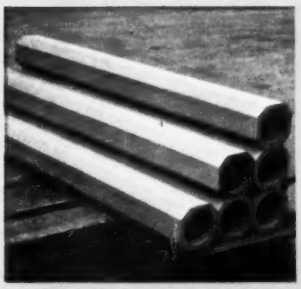
OCT-O-DUCT, flat-sided and octagonal in design, cuts field costs on handling, spacing and alignment in the trench.

OCT-O-DUCT, thanks to new manufacturing methods and machinery, is even stronger, smoother and more homogeneous than the former Soapstone round duct which has long been the Western standard.

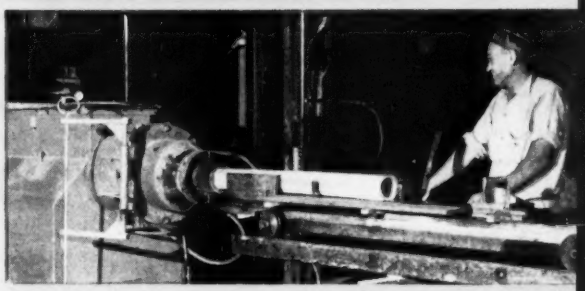
OCT-O-DUCT has been thoroughly field-tested and now carries the approval of leading Western utilities for both power and communication circuits.

OCT-O-DUCT is manufactured in a full range of sizes from 2" to 5" and is available, together with a complete line of fittings, for immediate delivery to trench-side in most of California.

OCT-O-DUCT continues the Soapstone tradition of having the lowest delivered cost of any underground conduit of comparable quality.



The flat-sided construction of OCT-O-DUCT is the key to many money-saving features: easier stacking and handling in storage; faster, cheaper spacing; easier handling and alignment in the trench.



Here's why the electrical, chemical and mechanical characteristics of OCT-O-DUCT are better. Powerful new extrusion presses, specially designed for Soapstone, turn out a smoother, stronger more homogeneous conduit. Smooth Soapstone has always been easiest on cables. Chemically inert, it dissipates heat rapidly and will not form slag or fuse with arcing cables.

SOAPSTONE DUCT COMPANY

110 Linfield Drive, Menlo Park, California • Factory: 3985 Beach St., Oakland, California

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MANUFACTURERS OF UNDERGROUND CONDUIT FOR OVER 25 YEARS

New cable withstands 1400 F flame for 24 hours in grueling laboratory test.

You can protect vital circuits against fire with NEW G-E silicone-rubber-insulated control cable

Adds Years to Life of Cable Used in High-Temperature Applications

General Electric's new control cable, for installation in extremely high ambients, will maintain circuit integrity even in case of severe fire along the cable run. In addition to withstanding tremendous heat (maximum ambient temperature for continuous operation is 257 F), the new G-E cable has an insulation that has the moisture resistance of the best grades of rubber—a combination never before possible.

No special tools or fittings are required to handle the new cable. Installation practice is generally the same as with any other rubber-type cable.

For vital control circuits in power stations, around boiler rooms, or in high-temperature processing operations, you should investigate G-E cable number SI-58134. See your G-E Wire and Cable specialist, or write to Section W88-1225, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

You can put your confidence in—

GENERAL ELECTRIC

Be Specific!

specify G&W potheads

To meet today's exacting requirements for continuity of electric service, it is essential to provide the best possible protection to cable ends. When you specify G&W potheads by name, you help insure trouble-free installations—as G&W users have done for almost 50 years.

G&W Potheads have been the established standard of the industry since 1905, when the company developed the first practical devices for sealing cable ends.

G&W introduced scores of developments which today are taken for granted in the industry. These G&W "firsts" testify to the forward thinking and practical engineering knowledge which have characterized the company since its beginning.

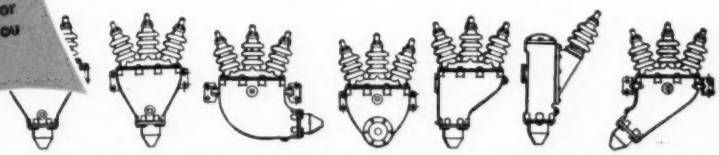
G&W having long maintained close contacts with electric utility, industrial and consulting engineers, and operating personnel, knows the problems in its specialized field, and has the experience needed to solve them.

G&W pioneered in the design and development of equipment for electric cable distribution systems. It is the company's long-standing policy to confine its efforts to this field and to continue, through constant research, to produce the finest equipment of its kind available anywhere

WHEN EMERGENCIES ARISE

G&W's primary function is to serve the electric industry. Despite a heavy backlog of orders, genuine qualified emergencies will continue to receive prompt attention. For critical needs or long-range planning, you can depend on G&W ... all ways!

Buy the high-voltage cable of your choice, but for uninterrupted performance, always be sure to specify G&W POTHEADS



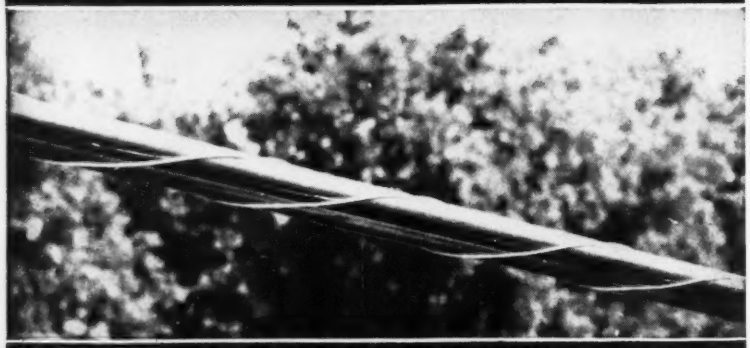
G&W ELECTRIC SPECIALTY COMPANY

7780 DANTE AVENUE, CHICAGO 19, ILLINOIS

Cable Terminating, Connecting and Sectionalizing Devices

Representatives in principal cities of U.S.A. • In Canada—Powerlite Devices, Ltd., Toronto, Montreal and Vancouver

SPIN CABLE LIKE THIS...



THROUGH TREE-CONGESTED AREAS AT MUCH LESS COST...

You can save man-hours of wood-cutting and customer complaints when you spin cable through tree-congested areas. What is more, spun cable costs much less to install than pre-assembled cable. Spun cable is so compact that it saves valuable space wherever congestion is a problem.

You save splices and installation labor, because light weight single conductor cables may be spun in lengths three times as long as pre-assembled cables.

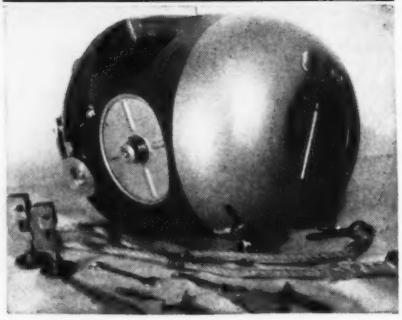
You reduce your cable inventories, because 1/c, 2/c and 3/c cables can be spun in the field as required.

Add to these benefits the extra margin of protection against storm damage... and you readily understand why there is a marked trend to cable spinning in the power field.

with NEALE Model "K"

HOW IT WORKS

Drum rotates when its two friction drive wheels respond to pulling of wire. Drum revolves once when 13" of wire is pulled — regardless of condition of strand. Drum carries two spools of wire, each spirals 13" giving support every 6½". Magnesium castings used wherever possible for lightness and strength. Weight: only 36 lbs. Overall length: 18½".



THE WORLD IS SPINNING—TOO!
PHONE 2-7234 5

Cable Spinning Equipment Co.

3100 TOPEKA AVE. TOPEKA, KANSAS

BULLETINS ETC.

(31) LIGHTING FIXTURES—Two new catalogs have been issued by Prescolite Mfg. Corp., 2229 Fourth St., Berkeley 10, Calif. No. R-8 is a 12-page booklet in color, illustrating and giving details on dimensions, wattage and framing-in for flush lights. No. S-3 is an eight-page catalog on surface fixtures and portable lamps. It shows the manufacturer's line of modern fixtures in a range of decorator colors and finishes.

(32) SELECTOR—The enlarged Immanco formed fiber wedge selector and a four-page product bulletin are available from Insulation Manufacturers Corp., 565 W. Washington Blvd., Chicago 6, Ill.

(33) STANDARDS—Philosophy and objectives of the voluntary standards movement are given in a 24-page booklet, "Standards Are Your Business," offered by the American Standards Assn., 70 E. 45th St., New York 17, N. Y.

(34) PANELBOARD—A new Quicklag circuit-breaker panelboard is described in a booklet from Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. This type NPLAB is for lighting and appliance branch circuit application and is claimed to cut job time and costs. The booklet is designated B-5644.

(35) HEATING—"Design for Modern Electric Heating" is the title of a 32-page booklet offered by Wesix Electric Heater Co., 390 First St., San Francisco 5, Calif. The booklet lists the various types of electric systems and heating units; gives suggestions for designing the home for electric heat and using electric heat in remodeling; contains a glossary of terms and phrases.

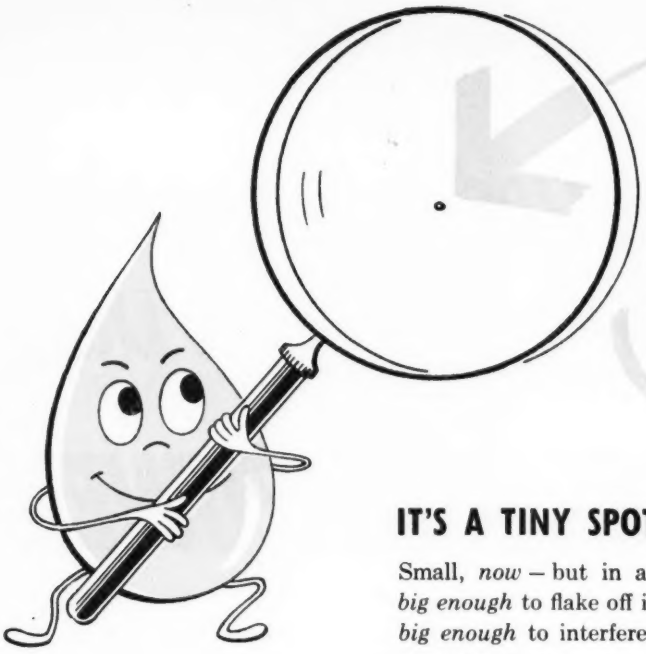
(36) INSULATION—Silicone glass Class H tubing and sleeving, a flexible combination of silicone varnish and braided continuous-filament glass yarn, said to resist temperatures as high as 200 C, and to conduct heat away from hot spots, is described with other Suflex Corp. products in catalog pages offered by the distributor in this area, Tri-State Supply Corp., 544 S. San Pedro St., Los Angeles 13, Calif.

(37) F FIXTURE—Peer Lite, a new air-cooled fluorescent fixture, is described in an eight-page booklet offered by Edwin F. Guth Co., 2615 Washington Blvd., St. Louis 3, Mo. Complete engineering data and dimensions are given.

(38) CIRCUIT BREAKER—In bulletin 18B7993 Allis-Chalmers tells design and construction features of its Ruptair magnetic air circuit breaker arranged for installation in horizontal drawout switchgear rated 13.8 kv. Copies are available from the manufacturer at 939 S. 70th St., Milwaukee, Wis.

(39) TIME SWITCHES—Heavy-duty time switches for automatic control of street lighting, store windows, signs and other applications are described in publication GEC-535C offered by General Electric Co., Schenectady 5, N. Y.

To Secure Bulletins Fill in Coupon on Page 64



This could cost you $5000 an hour!

IT'S A TINY SPOT OF RUST IN A TURBINE.

Small, *now* – but in a few thousand hours of operation, *big enough* to flake off into the turbine's lubricating system; *big enough* to interfere with the sensitive operation of the governor.

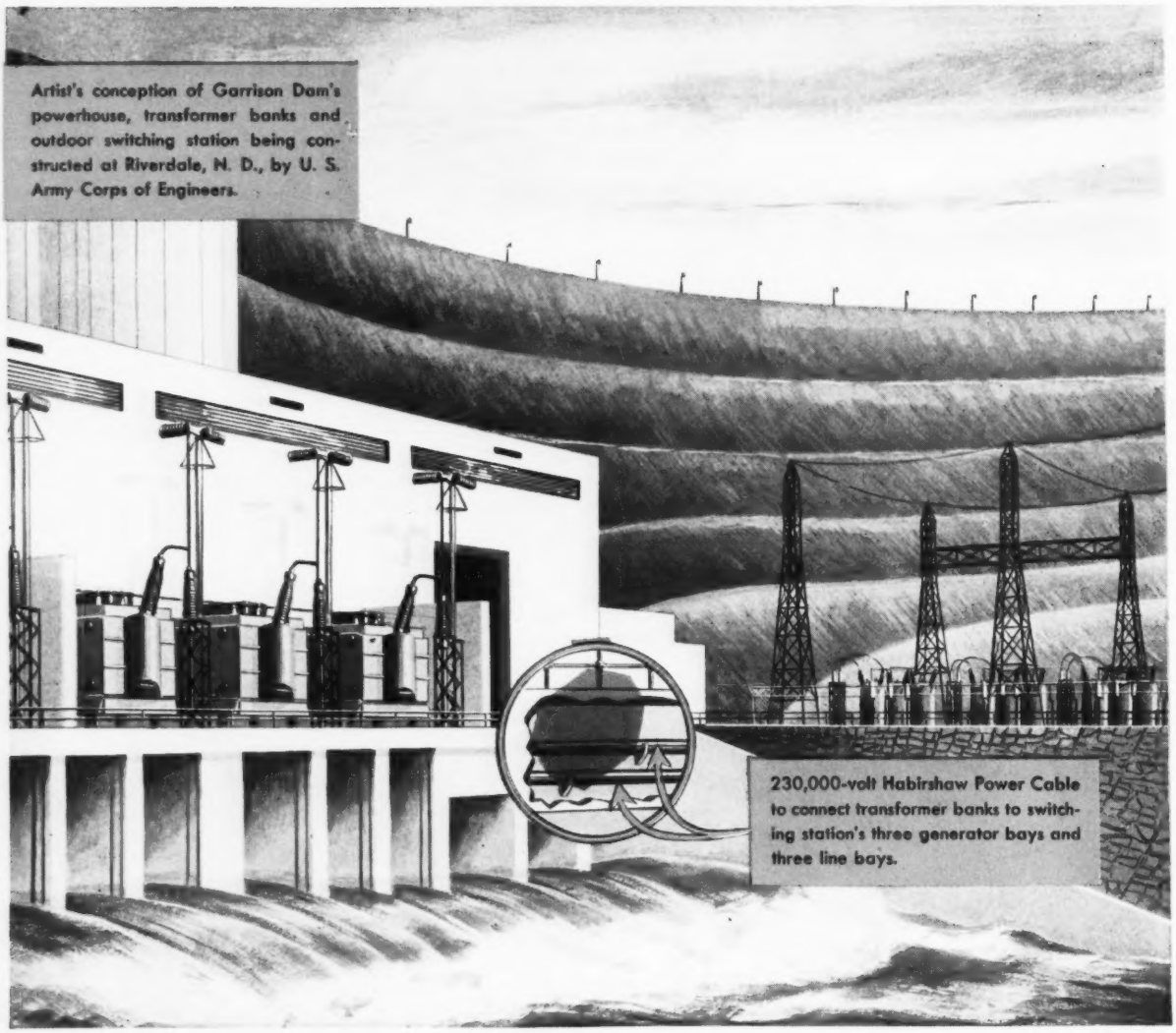
When that happens, shut-down costs and lost production can add up fast – to $5000 an hour in many recorded case histories of turbine failure.

Shell scientists have solved this problem with Shell Turbo Oil, an exceptionally fine, *rust-inhibited* turbine oil. Prepared from specially refined base stock, Shell Turbo Oil contains the most effective *rust inhibitor* yet devised – an exclusive Shell development. Test after test in actual plant operation prove no other turbine oil so effective in preventing rust – even in the presence of salt water. In one installation, for example, *the original charge of Shell Turbo Oil has been in use since 1940!*

Ask your Shell representative about the continuous service you can get with Shell Turbo Oil.

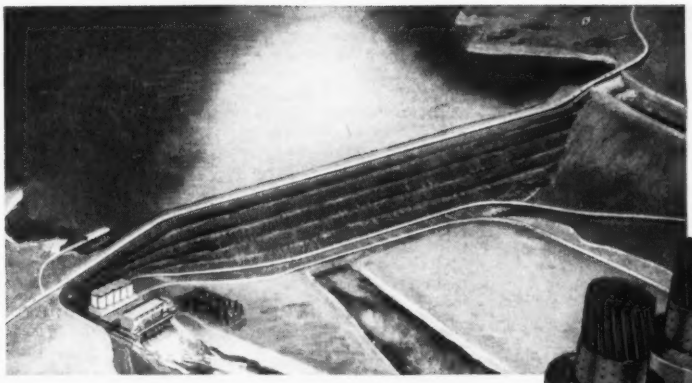
Phelps Dodge to supply new Garrison Dam

FIRST 230,000 VOLT POWER



Artist's conception of Garrison Dam's powerhouse, transformer banks and outdoor switching station being constructed at Riverdale, N. D., by U. S. Army Corps of Engineers.

230,000-volt Habirshaw Power Cable to connect transformer banks to switching station's three generator bays and three line bays.



with

CABLE IN THE U.S.!

Vital link for big Missouri River Dam will carry potential output of 400,000 kilowatts!

Habirshaw pipe-type power cable will provide a dependable and economical means of carrying this tremendous bulk of hydroelectric power at 230,000 volts, from the powerhouse to the outdoor switching stations.

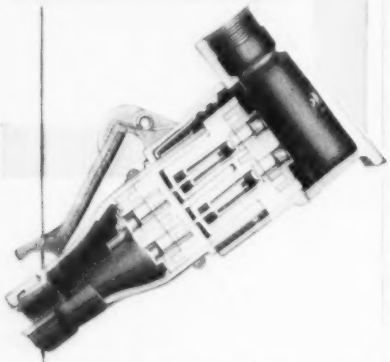
The cable, a product of Phelps Dodge Copper Products Corporation, will consist of three 500,000 circular mil copper conductors insulated with 835 mils of impregnated paper.

These insulated conductors will be pulled into pipes which will be filled with oil at a pressure of 200 pounds per square inch.

PHELPS DODGE COPPER PRODUCTS CORPORATION

QUELARC

The Circuit Breaking Plugs and Receptacles . . . Ratings Up to 200 AMPERES



The exclusive QuelArc construction provides exceptional protection to contacts, for safe use as current rupturing devices. Unique partitioned insulation provides extra long distance between contacts and between contacts and ground. Insulating chambers completely enclose all contacts and form an arc-trapping space. Galvanized cast metal housings, bakelite insulation and individually renewable contacts insure long service life.

QuelArc plugs and receptacles are available in a complete range of styles, 2, 3 and 4 pole types—grounded through shell or extra pole. Housings with threaded cap, plain cap or hinged spring door. Ratings 20, 30, 60, 100 and 200 amperes, 250 volts DC, 600 volts AC. Consult your Pylet Catalog 1100, Bul. 1140-2 for complete listings.

CONDUIT FITTINGS • FLOODLIGHTS

THE PYLE-NATIONAL COMPANY

1364 N. Kostner Ave., Chicago 51, Ill.

(40) DISTRIBUTION TRANSFORMERS — A 24-page booklet from Westinghouse discusses techniques and equipment for distribution systems. Curves, charts and pictures are used to show trends to higher kva ratings, higher voltages, underground distribution systems, three-phase transformers, secondary banking, direct pole mounting, solid grounding and transformer replacement. This booklet, B-5856, may be secured from Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

(41) CONTROLS—Paragon Electric Co., Two Rivers, Wis., has published a revised and enlarged edition of its booklet, "How Time Controls Save Work, Time and Money on the Farm."

(42) CABLES—Bulletin OK-1070 from Okonite Co., Passaic, N.J., gives information on insulated aluminum power cables. It is based on two AIEE papers by E. E. McIlveen and reviews properties, problems and advantages of insulated aluminum cables. In addition, resistance ratios, current carrying capacity conversion factors and size comparisons for equal voltage drops are included.

(43) STRUCTURES—Pacific Electric Mfg. Corp., 5815 Third St., San Francisco 24, Calif., has issued catalog sheet 604 on its structures for switchyards and substations. Installation photos are included.

(44) FAN-HEATER — Markel Electric Products Inc., Buffalo 3, N. Y., has issued a data sheet on its new Kool-N-Heetaire, a fan-forced radiant heater and a cooling fan engineered with a circular radiant ring that produces hot infrared rays. Model 25 is 1,320 w; model 26, 1,650 w.

(45) SCHOOL LIGHTING — A report on one city's school relighting program is given in a 24-page booklet published by Day-Brite Lighting Inc., School Lighting Division, 16 N. 9th St., St. Louis 1, Mo.

(46) SWITCH—The remodeled PMB-236 disconnecting switch for group operation is described in publication 5305 from Delta-Star Electric Division, H. K. Porter Co. Inc., 2437 Fulton St., Chicago 12, Ill.

(47) BOILER FEED CONTROL — Bulletin 1013 from Copes-Vulcan Division, Continental Foundry Co., Erie 4, Pa., describes the new Copes type 3-L boiler feed control, a three influence instrument type for high-duty boilers.

(48) LUMINOUS CEILINGS—Design data and results of laboratory tests on use of the plenum above its Acusti-Luminus ceilings are reported in a booklet offered by Luminous Ceilings Inc., 2506 W. North Ave., Chicago 47, Ill. The booklet describes such elements as pressure loss, flow pattern, heat transfer, plenum supply and plenum exhaust as well as material on sound absorption and acoustical characteristics. It was based on tests carried on by the Illinois Institute of Technology at Chicago. Requests should be addressed to the manufacturer's Engineering Department.

(49) METER SOCKETS — A 20-page booklet, GEA-5878, covering selection, installation and connection of watt-hour meters is offered by General Electric Co., Schenectady 5, N. Y. It was designed primarily for electrical contractors and utility companies.

(50) DATA CARD—A data card designed to help in design and operation of tubular equipment at elevated temperatures and pressures has been issued by the Tubular Products Division of the Babcock & Wilcox Co., Beaver Falls, Pa.

(51) TUBE SELECTION—A three-color chart to help in selecting its rectifiers, thyratron and ignitron tubes has been prepared by Amperex Electronic Corp., 230 Duffy Ave., Hicksville, L. I., N. Y. This company is also offering a revised edition of its condensed catalog.

(52) LIGHTING—An 80-page catalog of its line of lighting fixtures has been published by Electro Silv-A-King Corp., 2000 W. Fulton St., Chicago 12, Ill.

KILL TWO BIRDS WITH ONE STONE—Fill out this one coupon and get back valuable information from as many sources as you indicate.

ELECTRICAL WEST *Not good after February 1.*
68 Post St., San Francisco 4, Calif.

Please send me, without obligation, the new product information or catalogs:

If described in Product News, circle item number

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CABLE-GRAM
THE ULTIMATE PROOF OF QUALITY IS IN THE CONTINUING TEST OF TIME. FOR ALMOST ONE HUNDRED YEARS THE QUALITY OF KERITE INSULATED CABLE HAS BEEN DEMONSTRATED BY LONG DEPENDABLE SERVICE LIFE UNDER THE MOST SEVERE CONDITIONS. KERITE'S ACCEPTANCE IS GREATEST WITH THOSE WHO HAVE USED IT LONGEST.
THE VALUE AND SERVICE LIFE OF A PRODUCT CAN BE NO GREATER THAN THE INTEGRITY AND CRAFTSMANSHIP OF ITS MAKER.
DAYS KERITE
KERITE CABLE
THE KERITE COMPANY—30 Church St., New York 7, N. Y.
Offices also at 122 S. Michigan Ave., Chicago; 582 Market St., San Francisco;
3901 San Fernando Rd., Glendale 4, Calif.; 31 St. James Avenue, Boston

ELECTRA'S HUSBAND

Thanksgiving Letter To a Marine

"WHAT'S the matter with you? That's the fourth sheet of note paper you've torn up and thrown into the wastebasket," Electra said to me one evening recently as she sat knitting a pair of Argyle socks and I attempted to compose a letter at the writing desk.

"I'm trying to answer a letter that I received from your favorite nephew from Quantico," I answered. "I did not want to show it to you because you might think he was unhappy about being in the Marines."

"From the way you were acting I thought you were doing some preliminary work on your income tax," she commented. "But read me the letter."

"If I do, you'll have to help me compose an answer," I warned.

Here is the letter I read to her. It was dated Armistice Day.

"Dear Unk: Had the duty here in C Company last night so I couldn't make plans to go anywhere. Yesterday just happened to be the 178th birthday of the Marine Corps which was observed everywhere by Marines with the annual cake-cutting ceremony. Camp Upshur and its 1,100 second lieutenants witnessed it also, and then managed to do away with the cake at noon chow. Today everything is quiet and has slowed down to the weekend pace of lounging around, writing letters, reading books and playing checkers. A few have even managed to pull out their notes and field manuals on the mortar, studying for the test tomorrow.

"A quiet day, and a nice day too. The trees which were so beautiful a few weeks ago have now lost all their leaves; the snow storm last week aided in their final denuding. Whatever the weather is outside, today is another date we remember, only this one concerns more than just the Marines. Sometime within the 11th hour, of the 11th day of the 11th month of the 18th year of this century, World War I came to an end. That was 35 years ago. So much fighting has gone on since that to those of my generation WW-I was just another war among the many in history.

"World War II stands out a little clearer, mainly in that it was a change in living habits here in the U. S. I don't really remember too much sorrow or anguish—never was touched by it in Dixon. Now the fighting in Korea has stopped—perhaps for good, maybe for a short while just to break out again there or somewhere else. It all means a little more now, mainly because it has left its print on almost all the guys I went to school with. Some boys have had to stay permanently somewhere else.

"A couple of lines above I wrote, 'It all means . . .' By that I meant the whole picture—all that which has gone on before. People have been hurt by wars ever since there was a man—from Og, the Caveman, right on up through time and into this, the 20th Century. Some people get a little more than their share of what wars do. There is a girl in Washington who probably could tell you about this better than I could. She works for TWA. Her father was an Army surgeon in the last war, WW-II. He was killed. The boy she was going to marry—she was engaged to him—was killed in June on his 26th mission as a jet pilot over Korea. If you were to look at history more closely, this particular picture would be forever present.

"So have gone the many years of history, but now, you—'the husband of Electra'—what do you think the answer is to this? Is man supposed to devise ways for alleviating the great sorrows of war, or is he to sit back and say, 'I'm going to build a bigger war machine than you so I can kill more than you.' Or is he just to throw up his hands and say, 'Be happy, be gay, for tomorrow you may die.' Maybe it is all on a grander scale than we can understand, and one can say that we human beings are placed here on a little piece of real estate called Earth, to undergo a training period which will make us wiser and more human so that sometime later in the next life we will have learned enough to make better and more humane living possible. A fast look at world political events seems to make this last bit of reasoning the best. Anyway it is something to think about, and I'm not the only one who has ever thought about it.

"The 11th hour of the 11th day of the 11th month of 1953 has passed and the more mundane and commonplace thought of what goes down the gullet comes to mind. Guess I'll trundle on over to noon chow. Don't eat all the wild ducks. Sincerely, Robert."

For a time neither of us spoke. Finally Electra broke the silence.

"Whew, he must have been feeling down when he wrote that," she said.

"I don't agree," I contradicted. "Chances are that there had been a bull session and he put the gist of it down on paper."

"Anyway, it is a fine letter," she commented. "I don't see why you didn't want me to read it in the first place."

"You might have felt sentimental and sympathetic and have written him a lot of bunk," I said.

"So? Well what are you going to write him?" she challenged.

"That's the trouble," I reflected grimly. "I don't know. What would you say?"

"You're writing the letter," she said matter-of-factly.

"Since it's so close to Thanksgiving, I was going to tell him to be thankful that he and others like him can think and talk the way he has," I ventured. "The hope of all people must rest with the youth of the world. Heaven knows their elders have made a mess of the first half of this century. The spiritual renaissance that will insure trust and peace throughout the world has yet to show itself. But so long as young folks like your nephew reason for themselves and question the necessity for sacrifices like those he mentions, we too can be thankful. So long as he and his fellows are willing to accept the responsibility for helping to make the world better, even though they themselves must make sacrifices, we can look for human progress."

"Well, why don't you write it," she concluded.

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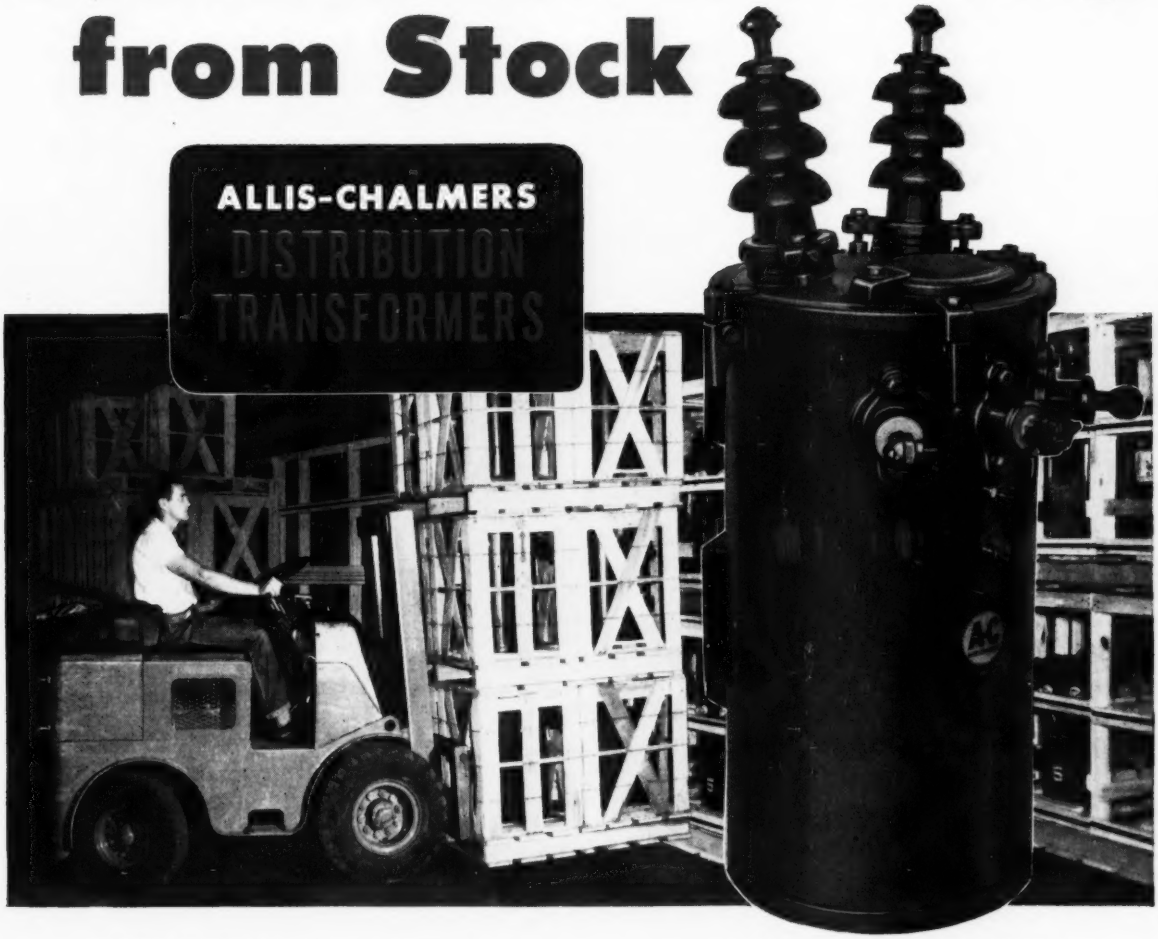

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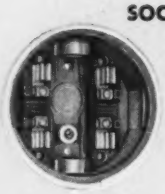
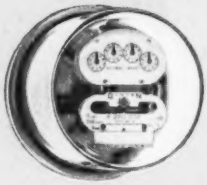
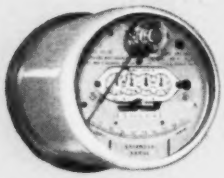


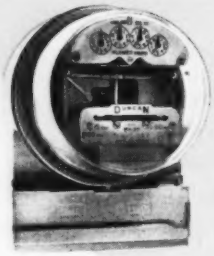
MOUNTING DEVICES

SINGLEPHASE WATTHOUR METERS





DEMAND METERS



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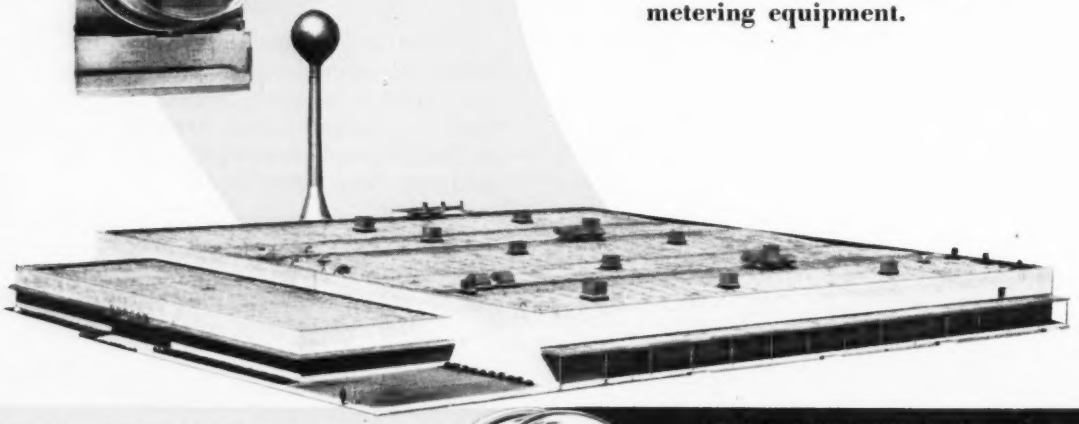
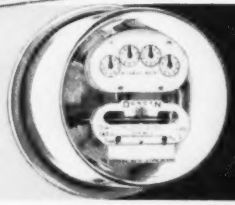


DUNCAN WATTHOUR METERS



Aerial view of new Duncan Plant. Completely air conditioned—modern in every respect.

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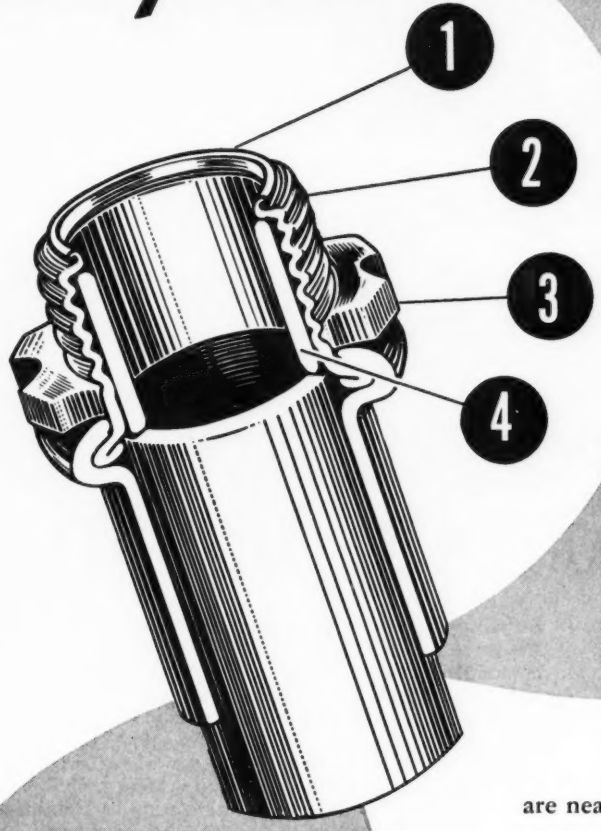

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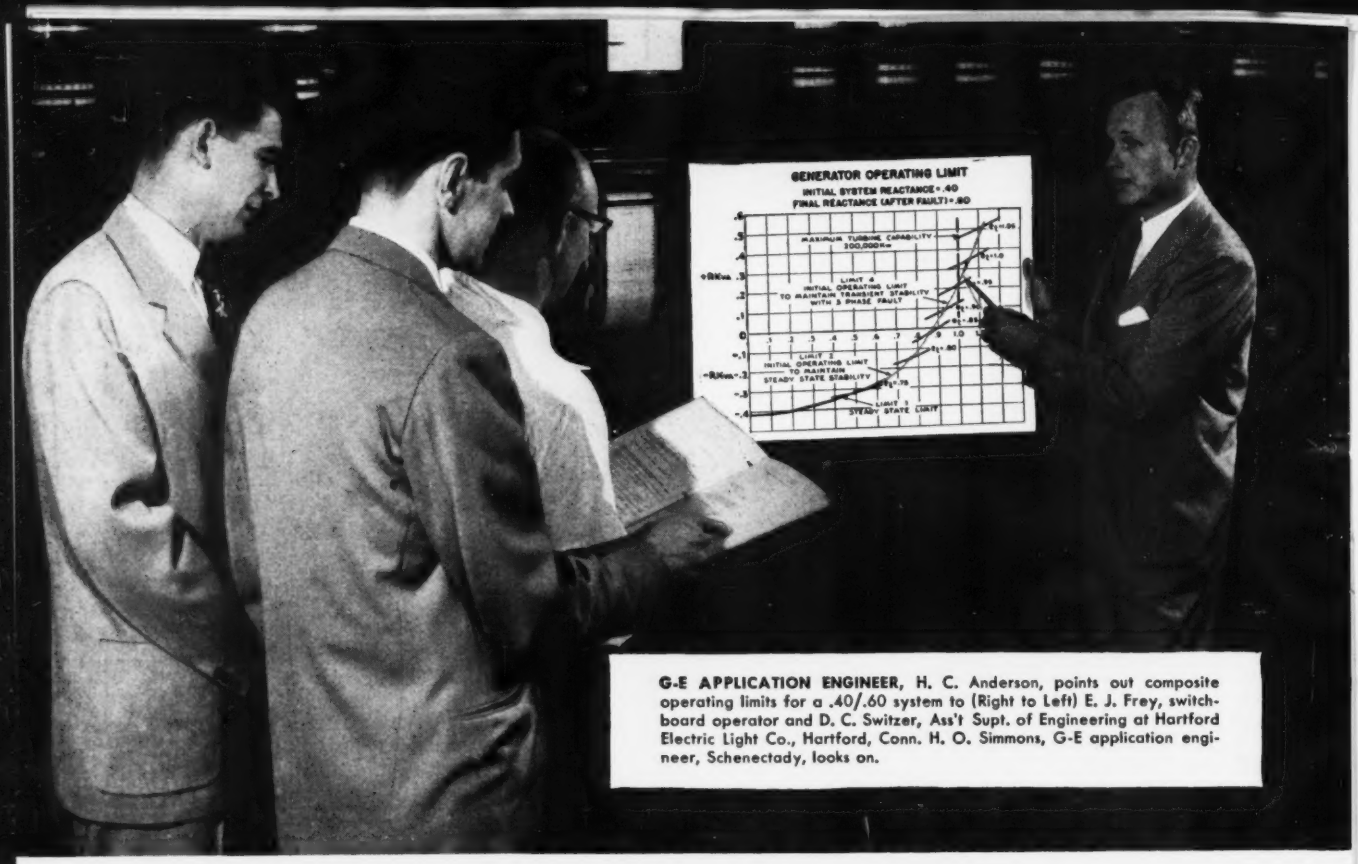
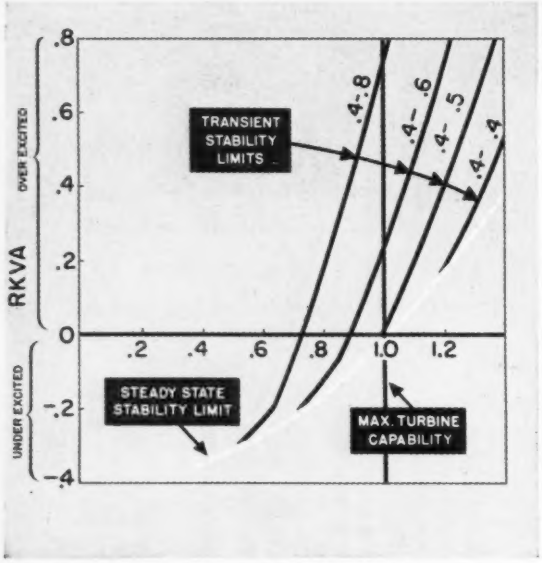

GENERATOR OPERATING LIMIT
INITIAL SYSTEM REACTANCE=.40
FINAL REACTANCE (AFTER FAULT)=.80
MAXIMUM TURBINE CAPABILITY 300,000Kw
LIMIT 4
INITIAL OPERATING LIMIT TO MAINTAIN TRANSIENT STABILITY WITH 3 PHASE FAULT
LIMIT 2
INITIAL OPERATING LIMIT TO MAINTAIN STEADY STATE STABILITY
LIMIT 1
STEADY STATE LIMIT

G-E APPLICATION ENGINEER, H. C. Anderson, points out composite operating limits for a .40/.60 system to (Right to Left) E. J. Frey, switchboard operator and D. C. Switzer, Ass't Supt. of Engineering at Hartford Electric Light Co., Hartford, Conn. H. O. Simmons, G-E application engineer, Schenectady, looks on.

New approach to system stability—

G-E ENGINEERING STUDIES HELP BOOST STATION OUTPUT, CUT OUTAGES



COMPOSITE LIMIT GUIDE, reactive KVA vs. KW, for generators on all systems with an initial reactance of .40. Solid black lines show specific generator excitation limits for systems with final reactance, after fault, of from .40 to .80.

Studies of power system stability, conducted by General Electric application engineers, today are helping utility companies obtain maximum kilowatt output from generating stations while minimizing the danger of system instability following severe faults, which could result in complete station shutdown.

Rapid system expansion and longer transmission distances, with the accompanying increase in system reactance, call for new attention to problems of system stability. This is particularly true if the system is split and/or reactors are added to prevent increases in circuit breaker interrupting requirements.

Operating guides developed from system studies now provide power station operators with a simplified means of keeping generator operation within known limits of stability. Setting up a minimum kilovar limit for any kilowatt output, these guides can be used to quickly estimate stability limits, insuring full utilization of generator capability as well as providing a tool for planning future system expansion.

Application engineers in G-E Apparatus sales offices can help apply these modern practices on your system. For full details write for GET-1972, General Electric Company, Section 301-232, Schenectady 5, N. Y.

1878 75 1953 YEARS OF ELECTRICAL PROGRESS

MORE POWER TO AMERICA

GENERAL ELECTRIC

DECEMBER 1953 Vol. 111, No. 6

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.

All interests in the community—the public, the municipality and the electric utility—gain with beautiful street trees of this type

Benefits of

A Selective Tree-Planting Program

E. G. Stahl

Manager, Agricultural Sales
Pacific Gas and Electric Co.
San Francisco

Trees are among man's most useful assets and, while there is no such thing as a bad tree, there has been much bad judgment exercised by uninformed people in selecting trees for a given purpose. Over the years one of the most persistent problems that has confronted utility operating departments has been the tree problem. Many trees that are planted along streets and highways soon grow up into power lines. These trees must be trimmed frequently in order to prevent damage

Here Are the Benefits

For the municipality—Low annual maintenance costs for trees; reduction of storm damage and the elimination of damage to sewers, sidewalks and pavements from trees that have too vigorous and too shallow root growth. Better street lighting;

For property owner—More beautiful picture book streets with trees tailored to fit the architecture of modern California homes;

For arborists and nurserymen—Greater public interest in trees and shrubs; and

For the utility—Better customer relations through an opportunity to participate in a popular community program. Fewer interruptions to service, less storm damage and a reduction in the rate of acceleration of tree trimming costs.

An OUTLINE

for a Comprehensive Community Street Tree Plan

I. SURVEY OF EXISTING TREES
- a. Good trees noted that may be kept
- b. Bad trees noted that may need replacing

II. OFFICIAL LIST OF TREES ADAPTABLE TO LOCAL CONDITIONS

III. MASTER PLAN OF TREES FOR ALL STREETS

IV. ORDINANCE CONTROLLING ALL STREET TREES
- a. Planting
- b. Maintenance
- c. Removal

V. DEVELOPMENT OF FINANCING PROGRAM

VI. PROGRAM FOR ACQUIRING PLANT STOCK

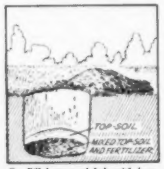
VII. PROGRAM FOR PLANTING AND MAINTENANCE OF STREET TREES
- a. Planting and Staking
- b. Fertilizing
- c. Watering
- d. Spraying
- e. Trimming
- f. Removing

12

16 Rules on

Selection and Planting of Trees

1. Select tree species with care because conditions vary widely in California.
2. Seek advice of your local Park Department or nurseryman.
3. Dormant season is best time to plant. Usually about mid-November to mid-March, or later in mountain areas.
4. Never plant on hot, dry or windy days.
5. Buy well-established nursery stock.
6. To plant a tree — mark out a circle at least twice as large as the tree roots, and larger where possible.
7. Dig out soil deep enough to allow for stone drainage. The hole must be as deep as it is wide.
8. Loosen subsoil if hard and put in 3 to 4 inch layer of crushed rock.
9. Fill one-quarter of hole with decayed manure, compost, or other bulk fertilizer, which has been thoroughly mixed with an equal amount of good topsoil.
10. To avoid root-burn, cover fertilizer with 2 to 3 inch mound of topsoil. This will act as insulation between roots and fertilizer.
11. Hold tree in place and gradually place top soil about roots.
12. Cover roots of tree with topsoil, then tamp with heavy stick or shovel handle, or foot.
13. When hole is three-quarters full, pour in water so soil washes about roots. Try to find and eliminate any air pockets.
14. Continue to add soil, leaving it loose on top, until ground level is brought to previous planting level on tree trunk.
15. Make ridge of soil about base of tree to hold water for a few weeks.
16. Place two or more strong stakes around tree for protection and bracing. Where rope or cord is used to tie the stakes together, do not bind the tree.



1. Fill bottom of hole with layer of fertilizer which has been thoroughly mixed with top-soil.

2. Cover fertilizer with mound of soil, rest center of roots on mound, fill in and tamp.

3. After filling in, prepare basin for watering.

13

Double-page spread from the booklet "Trees to Fit Your Home and Your Street" being distributed by PG and E as a community service

to the tree and interruption to power service.

Trimming costs have become a major item of operating expense for the utility and these costs are increasing at a rapidly accelerating rate. The employment of tree experts to do the job on a contract basis has eased the work load of utility personnel and has greatly diminished customer complaints but the yearly increased expense is an item of much concern. Furthermore, trimming even when done by experts does not provide full protection from storm damage resulting from trees or broken limbs falling into power lines.

About five years ago, the Pacific Gas and Electric Co. began an investigation of the tree problem, with the hope of formulating a plan that would lead to a reduction in tree trimming costs.

This investigation was directed toward the following objectives:

1. A study of the appearance, growth characteristics and behavior of trees most desirable for street and shade tree planting under California climatical conditions.

2. An investigation to determine the agencies, organizations, groups and individuals most interested and influential in the promotion of selected trees for streets and highways.

3. The formation of a plan for uniting these groups in fostering a better choice of trees for city streets and highways.

Improper trees damage sidewalks and curbs

From the beginning the company has relied heavily upon the experts for technical advice. No selection of recommended trees was made without their full approval. No pamphlet or guide book was printed without their approval. Most of the leading arborists of the state are listed among the members of the Western Shade Tree Conference or are on the directorate of the Saratoga Horticultural Foundation. Members of both of these organizations have given invaluable assistance in providing technical information for the street and shade tree program. Among all of those who have contributed so freely of their time and effort there is space to mention only one name — that of Maunsell Van Rensselaer, director of the Saratoga Horticultural Foundation.

During the company's study of the street-tree problem early contacts with park superintendents, city officials and arborists brought to light a fact that has had great bearing upon the success of the program, namely, that the same tree characteristics that are desirable for the property owner and the municipality are also most satisfactory from a utility operating standpoint. Conversely, those trees that are un-

desirable for the property owner and the municipality are also undesirable for the utility.

Program Is Set Up

With this basic fact clearly understood, grounds for mutual interest in the promotion of a tree program were clearly apparent. Under the guidance of leading arborists the company prepared a guide book entitled *Trees to Fit Your Home and Your Street*. This booklet outlines the problems created by trees that are unsuited for street planting and points out the desirable characteristics for street and shade trees. It contains colored pictures with descriptions of 20 street trees that are recommended for their beauty and good behavior. The booklet also lists some 26 additional trees that may be desirable under special conditions and further lists eight trees often found on streets and highways that are not desirable under any condition for street and highway planting.

The booklet, and a handout piece of the center section containing the 20 selected street trees, has been given wide distribution to city officials and planning commissions, to garden and civic clubs, and to other public groups throughout the company's territory of operation. In addition to the booklet, the company has also prepared a slide film which outlines the program and suggests a plan of action for municipalities through which the objectives of the program may be accomplished. Also, to assist planning commissions and municipal officials in setting up their program, the company has available for distribution sample copies of street tree ordinances that have been found to operate successfully in other communities.

Objectives of Program

The objective of the program is to secure the passage of a street tree ordinance in every municipality within the company's area of service and with it the adoption of a recommended tree list. Such ordinance restricts the planting of trees along city streets to those varieties contained in the recommended list; also, to provide for setting up a program of removal of undesirable trees.

In each of the company's operating divisions, one employee has been selected to administer the details of company promotion and to report the results that are obtained.

There are 150 incorporated municipalities within PG and E's area of service. During the first six months of promotion 39 municipalities either have adopted the program or have the question under consideration.

These hazardous and unsightly trees are eliminated under a selective planting program

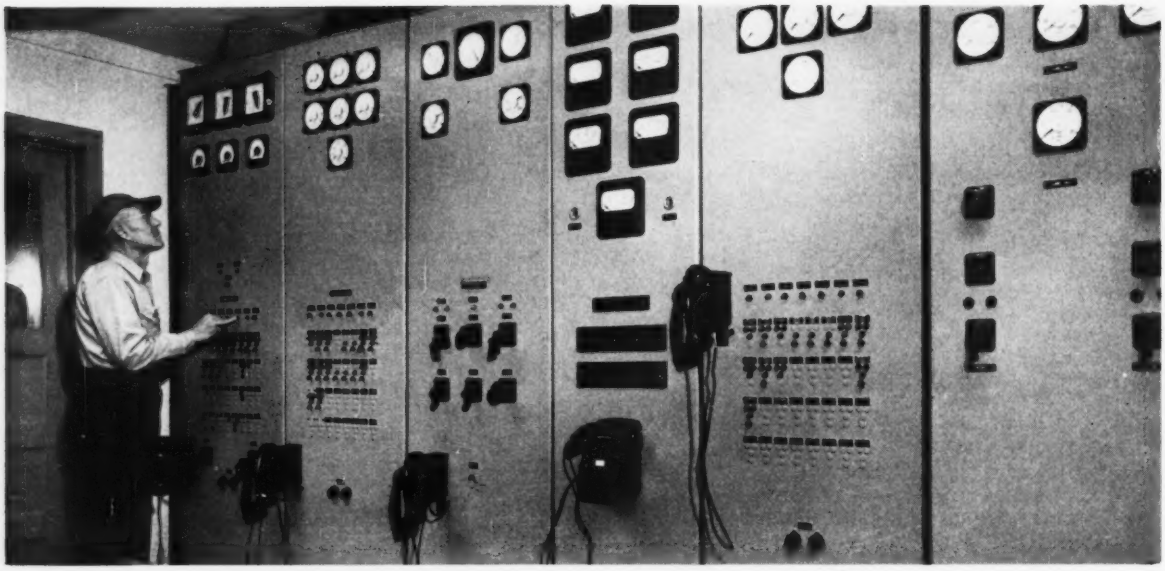
A fact contributing to the long-range success of the program is that the benefits to be gained extend to many individuals and groups. These benefits are partially enumerated in the accompanying box.

Results of a program of this kind must be evaluated on the basis of long-range benefits. It can not be expected and it is not desirable that spontaneous overnight action be taken by city governing boards. Such action requires broad public support and such support can be developed only through a long-range educational program based on proven facts. There is also the question of supply of trees. A broad adoption of this street-tree program will bring about changes in the number and kinds of trees that nurserymen will be called upon to provide. It takes time to grow and to make new varieties of trees available for customer planting—usually from two to five years—and it takes a great deal more time to bring in new species and to select better horticultural types within these species.

A fair assumption of the time required for each phase of the program would be about as follows: educational period, up to two years; tree removal and tree planting period, after three years; reduction in acceleration of tree trimming costs, after five years.

This program has been under active promotion by PG and E for the past six months. So far results have been most encouraging. It has met with enthusiastic reception by practically all naturally interested groups. In fact, so much public interest has been created that the arborists and nurserymen are finding it difficult to meet the public demand that has been created for new types of trees. As pointed out above, this question of supply takes time but definitely will be solved.

We have every reason to believe that the program as presently designed will accomplish the purposes for which it was planned.



Experience with supervisory control on its North Umpqua River hydro development has shown California Oregon Power Co. that . . .

Automation Cuts Energy Costs Sharply

Nearly half of Copco's hydro generating capacity is under semiautomatic or supervisory control. More is being planned

P. G. Humphreys

Production Superintendent
California Oregon Power Co.
Medford, Ore.

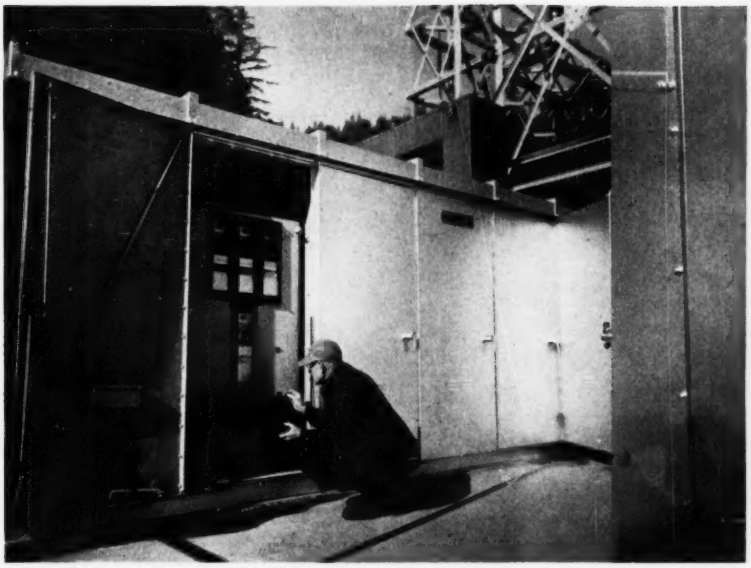
From an operating standpoint supervisory control of remote hydroelectric plants has been found practical, efficient and economical by the California Oregon Power Co. Greatly reduced operating costs and energy costs have resulted, making feasible to a greater degree the development of small capacity hydroelectric sites.

Automatic control of hydro plants with Copco dates back to 1924. In that year a 4,000-kva plant was placed in operation on Link River at Klamath Falls, Ore. There are now 12 plants on the system with automatic or semiautomatic operation. These have a combined name-plate rating of 97,870 kw, or 43.8% of total system capacity, and produce 580,422,000 kwh annually, or 42.5% of total generation.

North Umpqua Development

Supervisory control has been used extensively on the latest of these plants on the North Umpqua development. These plants are located on the upper reaches of the North Umpqua, the

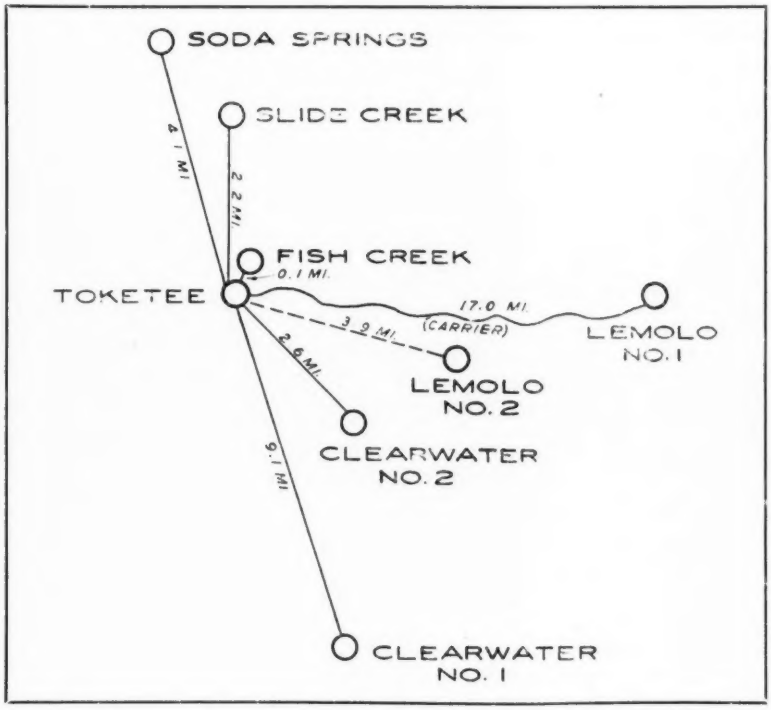
Soda Springs is typical of six outdoor plants that will be under supervisory control



Front and rear views of supervisory control cabinets at Soda Springs plant. All important functions are controlled from Toketee

downstream plant being some 60 miles east of Roseburg, Ore. The development will include eight individual power plants, as shown, consisting of 10 hydroelectric generators. They are all located within a radius of approximately 12 miles and, when completed, will provide total additional capacity in the amount of 215,000 kva.

The first development is known as Toketee and consists of three 16,667-kva units. The second plant is known as Slide Creek and consists of one 18,000-kva unit. The third is Soda Springs, the farthest one downstream, and is rated at 12,940 kva. Two of the developments are known as Clearwater No. 1 and Clearwater No. 2. Clearwater No. 1 carries a rating of 17,647 kva. Clearwater No. 2, just placed in operation, is rated at 30,588 kva.



Sketch showing centralized control from Toketee and supervisory control channel lengths

The remaining two developments now under construction will be known as Lemolo No. 1 and Lemolo No. 2. No. 1 will be rated at 34,118 kva, No. 2 at 38,824 kva.

The North Umpqua development described in ELECTRICAL WEST, April 1950, p 66, had an original estimated unit cost of $180 per kilowatt of installed capacity — an unusually low cost in this inflationary period. Several factors contributed to this low cost. The projects were laid out having in mind the maximum use of the available materials on the job site and minimum use of cement, steel and equipment that had to be transported.

In general the open conduit system for conveying water, consisting of low dams, lined canals and wood flumes, was selected rather than closed-type conduit. For economy in construction and erection of the turbines and generating equipment, a 97-ton portable gantry crane was designed that could be moved from one plant to another during construction. After construction is completed this crane will become a permanent piece of equipment to be utilized at any one of the seven outdoor-type plants for operation and maintenance.

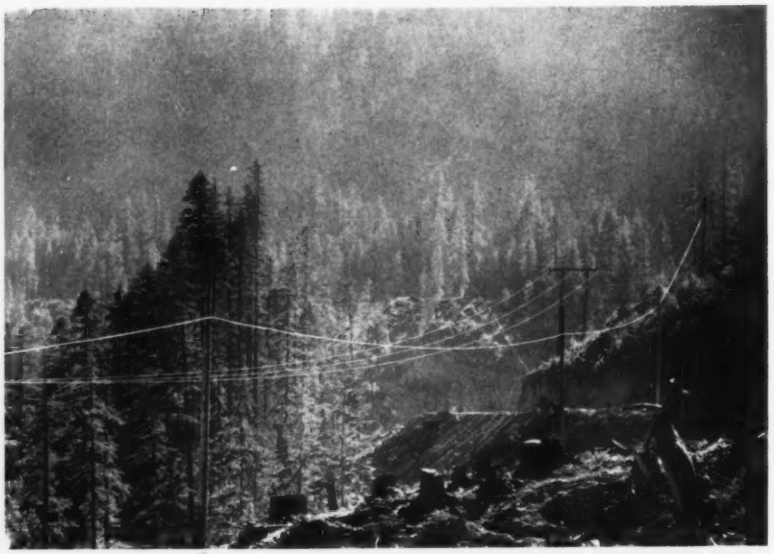
Transformers were purchased as single-phase units for size and weight and so one special transformer can be used as a spare for the 30 power transformers for the project's eight plants. All plants, with the exception of Toketee, were laid out as single-unit, outdoor-type, fully automatic stations with supervisory control from the

Toketee power house. All eight plants will be operated by the eight operators in the central Toketee station.

Supervisory Control

The three-unit Toketee plant is more or less conventional for a modern hydroelectric station, the units being installed in a power house with overhead crane, operators' bay, etc. This plant may be considered as the hub of operators for the entire development. Operators at this location now control four plants by supervisory equipment and one remotely over a multiple-conductor cable. The Lemolo plants will also be supervisory controlled.

A journeyman power house operator is in attendance on each shift at the Toketee plant. The operators are supervised by a foreman and assistant foreman who have jurisdiction over the entire development. Slide Creek and Soda Springs plants are controlled by conventional supervisory equipment, utilizing a single pair of wires for each, in an overhead control cable.



Supervisory control cable is supported by Copperweld messenger on separate pole line

Supervisory Control Circuit

A high degree of reliability is essential in supervisory control circuits. In all instances, the control circuit has been placed on pole lines separate and apart from the transmission line. Both pole lines traverse a wide clearing beyond reach of any falling tree. The circuit for any plant is carried over a preassembled multiple conductor, Flamenol jacketed cable, banded to a ⅜-in., extra-high-strength Copperweld messenger for attachment to the poles. Normally, the cable is made up of six No. 16 conductors with 2/64-in. Flamenol insulation. Two are utilized for supervisory control, two for differential tripping and the other two are for communication or spares.

The Lemolo No. 1 plant, on which construction has just commenced, will be supervisory controlled with a 16-mile portion of the circuit consisting of a carrier channel on the transmission line. Reliability of the carrier is considered adequate for the purpose, since the plant will operate on Selsyn control and will feed into a stub transmission line. Interruption of the carrier circuit by transmission line trouble will not be serious, since the plant has no other outlet for its power and would shut itself down in the event of trouble.

Functions Controlled

The equipment for the Slide Creek plant, which is typical of those controlled by supervisory, provides the following functions:

Start and stop of the machine; position indication and control of the machine breaker; load limit with raise and lower control and position indication; generator voltage control, with indication of vars; headgate position with provision to close; control of the station service breaker; station output in megawatts; a general alarm to indicate operation of one of the protective devices at the station; headworks water level with alarm for high and low level; trash rack low water alarm; head level load control; and a telephone circuit.

Control of the Soda Springs plant is similar to that for Slide Creek, but provides the following in addition:

Tail-water-level indication; spillgate control with position indication; and control and indication of a synchronous by-pass valve with position indication.

Governor speed control on each of Slide Creek and Soda Springs has recently been added. This permits separation of these two plants from the rest of the system and provides for speed regulation with one or the other, if required.

Tail-water-level indication on the Soda Springs plant is provided in order that the operators may maintain discharge below the plant equal to the average streamflow, and thereby accomplish steam re-regulation necessitated by operation of the plants above for peaking purposes.

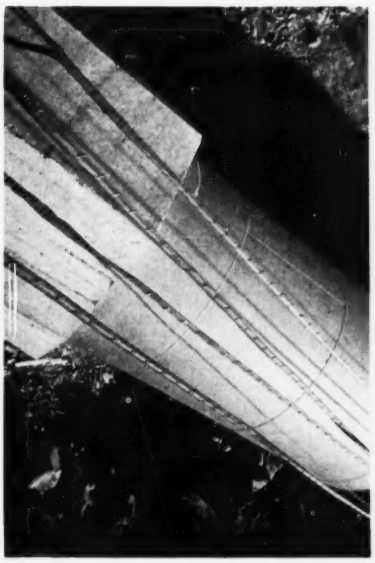
The Fish Creek plant is located within 300 yd of Toketee, the controlling plant. The distance between the two being so little, it was more economical to exercise control of Fish Creek remotely over a multiple-pair cable. All plants are equipped with automatic start-up and synchronizing equipment, so the start-stop supervisory control point merely serves to close or open the master relay circuit at the plant.

Reduced Operating Costs

Unit operating costs at the Slide Creek plant, with an average monthly output of approximately 9,000,000

Automatic or Semiautomatic Plants

Plant	Name Plate Rating — kw	Annual — kwh
Alturas	450	1,740,000
Prospect No. 1	3,760	33,463,000
Prospect No. 3	7,200	50,145,000
Prospect No. 4	1,000	7,734,000
East Side	3,200	19,663,000
Keno	760	3,866,000
Winchester	500	3,759,000
Slide Creek	18,000	107,518,000
Soda Springs	11,000	67,426,000
Fish Creek	11,000	76,727,000
Clearwater No. 1	15,000	58,253,000
Clearwater No. 2	26,000	150,128,000
Total	97,870	580,422,000
Total system	223,670	1,361,263,000
Total automatic	97,870 — 43.8 %	580,422,000 — 42.5 %



Control cables follow penstock in this case

Large sheaves were used in stringing cable

kwh, are on a par with the operating costs of the company's Prospect No. 2 plant, having an average monthly output of some 23,000,000 kwh. One of the smaller plants on the system, constructed in the early part of the century, and having an average monthly output of some 900,000 kwh, has an operating cost 11½ times greater than the Slide Creek plant.

Maintenance Practice

The supervisory-controlled plants are serviced daily by an employee classified as maintenance man. His duties are to keep all equipment properly lubricated, premises clean, racks clean, make observations of the bearing and transformer oil levels, and report kilowatt-hour meter readings and bearing temperatures periodically to the operator at the controlling station. In case of a relay the maintenance man, if on duty, reports to the operator of the controlling station the numbers of annunciator targets that have dropped. If the relay was caused by line troubles, as indicated by the targets that have dropped, the maintenance man is asked to reset the necessary relays and the plant is returned to service in the normal manner. If the targets indicate mechanical or electrical trouble within the plant, the power house foreman or assistant foreman or some other qualified person makes a trip to the remote plant to investigate the trouble before attempting to return the plant to the line.

One maintenance man serves both the Slide Creek and Soda Springs plants, spending one-half day at each. He is relieved on two days of each week by another man with the same classification who, on the other three days of his week, carries out maintenance work on the canals, flumes and other structures. The Fish Creek plant is serviced by an advanced apprentice on duty at the nearby Toketee plant. The Fish Creek plant is checked each day by the foreman or assistant foreman. Operation of the plants to be constructed or in the process of construction will be carried out with a like personnel force.

The largest unit in the development, Lemolo No. 2, rated at 38,824 kva, should produce energy at approximately one-half the cost per kilowatt-hour, as at the Slide Creek plant, previously cited.

Automation of Other Plants

Copco has recently investigated the feasibility of making its 25,000-kw Copco No. 1 development fully automatic with control from the Copco No. 2 plant, some two miles distant. A saving in operating cost of some $10,300 per year is estimated after considering the carrying charge for the expenditure. This approximates the yearly wage of two power house operators, or about equals the present operating cost for a three-month period. In other words, automatic control of the plant should reduce the unit operating costs per kilowatt-hour produced by 25%.

Reference was made to the Link River plant, first to be made semiautomatic, there being provision at the West Side plant, some one-half mile distant, for closing the master contactor and starting up the unit. Synchronization is accomplished at the West Side plant by an operator on duty there. The operator has remote control of governor synchronizing motor, governor load limit motor, regulator voltage adjusting rheostat and generator field rheostat.

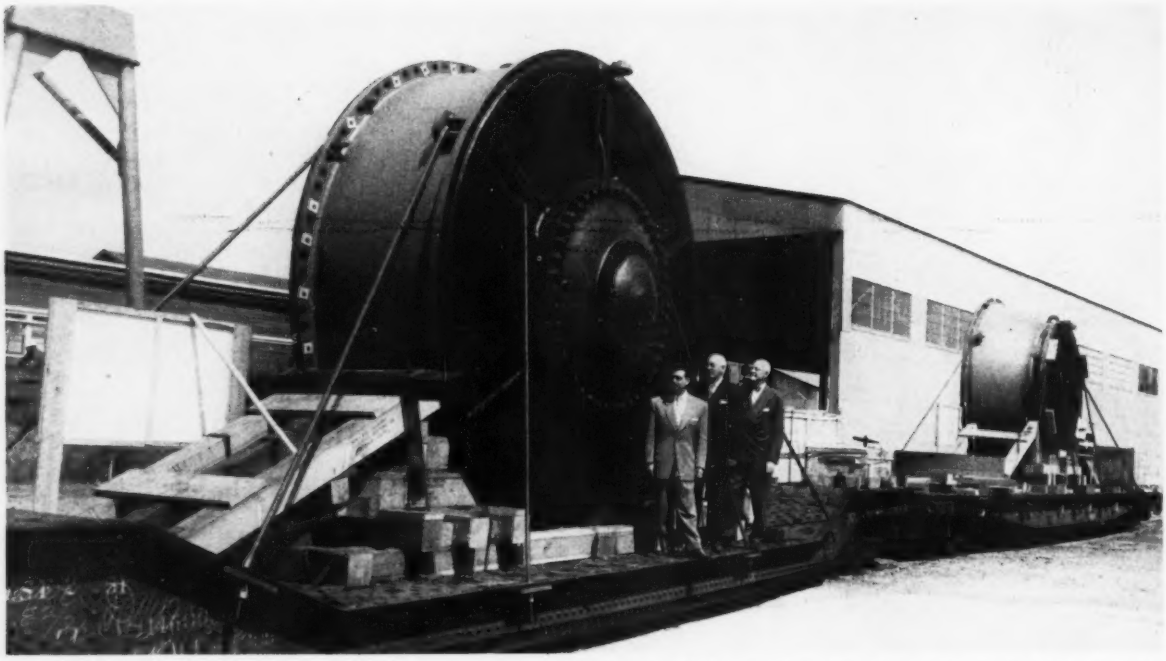
Servicing of this plant is handled by personnel on the regular force at the West Side plant. Operating costs, as compared to other plants on the system with like monthly output and fully manned by operators, are one-tenth as great.

A like example exists at the Prospect No. 3 plant. A 9,000-kva vertical unit utilizing water diverted from the south fork of the Rogue River was completed in 1932. It is arranged for fully automatic operation. On charging the transmission line leading to the plant, circuits are energized by the station service bank. This results in the master contactor closing, the hydraulic controller operating and the generator accelerating to approximately 98% synchronous speed. The generator is then automatically connected to the line and field excitation applied. The machine is equipped with amortisseur windings that cause it to pull into step.

On closing, the main breaker load control is transferred to the Selsyn forebay float control mechanism, which allows the gates to open slowly. Load is assumed by the generator in accordance with the quantity of water available. Shutdown may be accomplished, either by manually reducing the load to zero and opening the breaker, by operation of one of the protective devices, or by opening the breaker on the transmission line connecting the plant with the rest of the system. The breaker is located near and remotely controlled by the operator at the Prospect No. 2 plant.

This plant has been operated since its construction by a single attendant with the classification of Class D, power house operator. He normally puts in an 8-hour day and is occupied with general servicing and upkeep of the equipment. The plant produces approximately 4,400,000 kwh per month at an average operating cost just slightly above the cost per unit for the Prospect No. 2 plant producing some 23,000,000 kwh per month, previously cited.

Supervisory control of remote plants is considered satisfactory from an operating standpoint by the California Oregon Power Co., and the most economical sort of remote control yet developed. It is felt that, after the current construction period is completed on the North Umpqua development, several of the existing older plants will be equipped for semiautomatic operation to reduce operating costs.



Shipping problems have been greatly reduced by a new design for hollow-jet discharge valves. Here two cars contain whole assembly

Hollow-Jet Valves Are Less Destructive

New oil-operated valve design reduces weight 30% over mechanically operated valve, at same time retaining nondestructive advantages of the latter

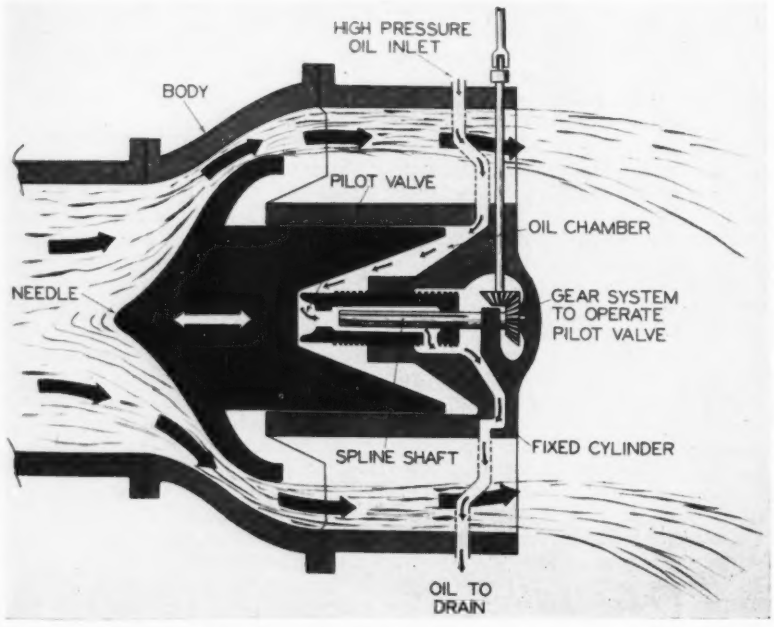
G. H. Heiser

Westinghouse Electric Corp.
Sunnyvale, Calif.

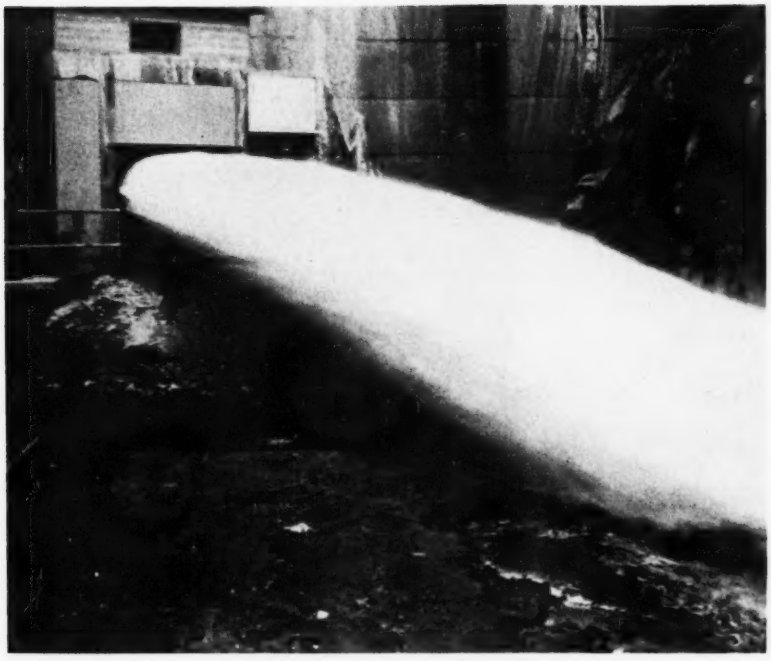
Of interest to hydraulic engineers is a new hollow-jet*, high-head, free-discharge valve for use in regulating and discharging water from storage reservoirs. Aeration and the hollow form of the jet creates a soft discharge into stilling basin or flow channel. Shape of the water passage beyond the valve seat produces the hollow jet as well as aerating the water as it passes through the valve.

Construction and maintenance costs of stilling basins and channels are reduced because of relative freedom from erosive action of the discharge. Another important advantage is absence of mist and spray where electrical installations or highways are nearby. Where freezing temperatures are encountered, the valve also prevents icing on nearby areas.

* B. H. Staats and G. J. Hornsby, U. S. Bureau of Reclamation, were inventors of the hollow-jet valve.



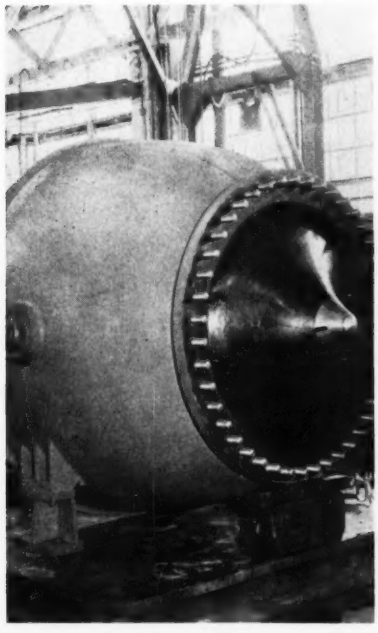
Hollow-jet discharge valve is operated and balanced by oil pressure instead of water



Hollow form of jet creates soft water discharge into stilling basin or flow channel

Partial vacuums that give rise to cavitation in other types of free-discharge valves are eliminated. A further feature is elimination of the vibration effects of cavitation that can cause damage to the valve and surrounding structure.

The hollow-jet valve is the ideal selection where close regulation of discharge is important. The valve always discharges axially regardless of head opening and the jet is constant in diameter and flow pattern for the same head, through the full range of valve openings. Forty-three of these valves have been put in operation in this and foreign countries since the first hollow-jet valves were tested at Hoover Dam in 1945. Valves built so far have an inlet diameter ranging from 14 to 102 in. A 102-in. valve can discharge 3,650 cfs under an effective head of 130 ft.



Acme-threaded screw actuates needle valve

In the hollow-jet valve flow is controlled by the positioning of the needle, which seats in the upstream direction. The needle has several holes in its all-cast design, to admit water to its interior to put the valve in complete balance when fully closed. The valve is very nearly balanced in open positions, the amount of unbalance being dependent on the diameter and location of the balancing holes and the effective head.

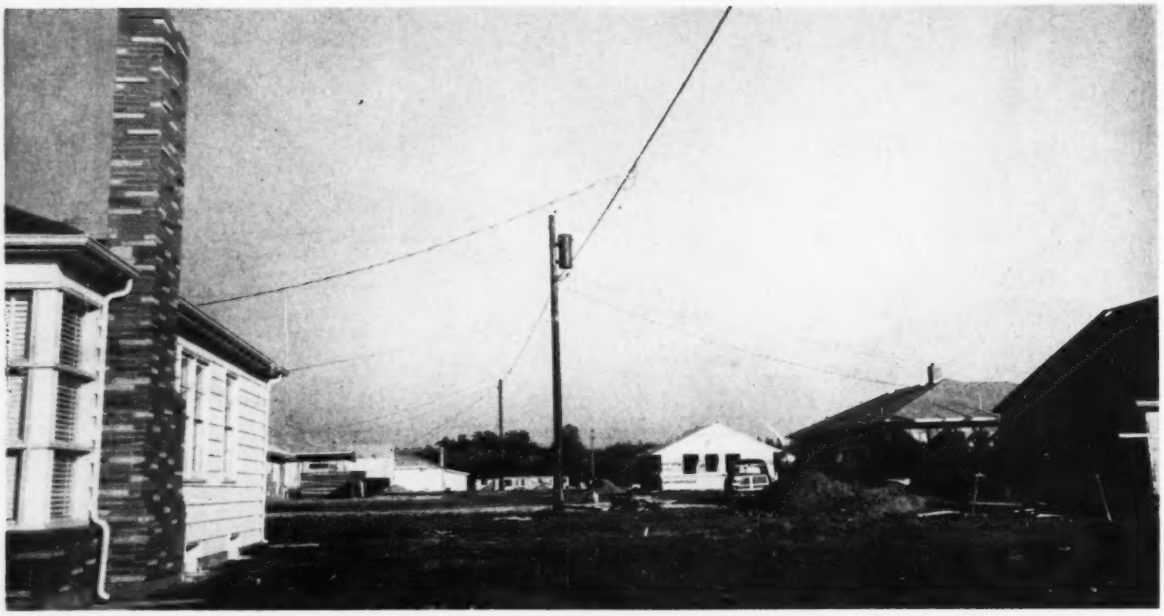
A gear train and screw, operated by hand or by electric motor, moves the needle backward and forward. Little torque is required because of the balancing feature. The fact that the valve cannot slam shut prevents destructive water hammer in penstock and upstream works.

An all-cast valve with the same flow characteristics and advantages of a soft hollow jet, freedom from cavitation, erosion and vibration, and easily regulated, has been developed by Westinghouse engineers. This valve, shown in cross section, is not balanced by water pressure but is operated and balanced by oil pressure. The needle is operated by high-pressure oil pumped into the cylinder between the two cones forming the needle. Oil pressure builds up until the needle just moves. A state of equilibrium then exists between the water load on the valve and the operating oil pressure. An Acme-threaded screw, working through a gear train, is moved by hand or electrical remote control to move the needle further.

A variable orifice located between the needle support cone and the screw end is controlled from the Acme-threaded screw. As the screw is moved to open the orifice, oil flows from the chamber changing the balance and the needle moves in the opening direction. Stopping movement of the screw stops the needle in any position. The oil under pressure can then be shut off and the needle is supported mechanically on the stem, positively locked by the Acme threading. The screw is simply turned in the opposite direction to close the valve. This tends to close the orifice and the pressure is built up to balance the needle. The needle continues to close smoothly with continued movement of the screw. Thus, as with the mechanically operated valve, there is no possibility of slamming.

Static head of water above the valve at shutoff determines maximum pressure available within the needle chamber of the mechanically operated valve. Outside diameter of the needle cylinder must correspond to the seat diameter for the needle to be balanced when shut off. After the needle cylinder diameter has been established, the outer barrel diameter of the valve becomes fixed. This latter diameter must be sufficiently large to permit discharging the required amount of water with enough space left between the inner diameter of the hollow jet and the needle cylinder to permit the proper entrance of air into the water stream.

With the pressure system used in the Westinghouse design, independent of the penstock pressure, higher pressures are available to operate the needle. Thus the needle cylinder can be appreciably reduced in diameter, which in turn makes possible a reduction in the diameter of the outer barrel cylinder. Use of the oil-operated valve results in a weight reduction of about 30%, reduction in size of machine tools required and simplification of shipping problems associated with larger valves. Corrosion and maintenance are practically eliminated also, since all moving parts of the valve are completely submerged in oil.



When Pacific Power & Light adopted this type of construction with aluminum aerial secondary cable and triplex services . . .

Streamlining Was the Compelling Factor

Demand is growing in the West for a new type of streamlined line construction to serve the many new tract developments

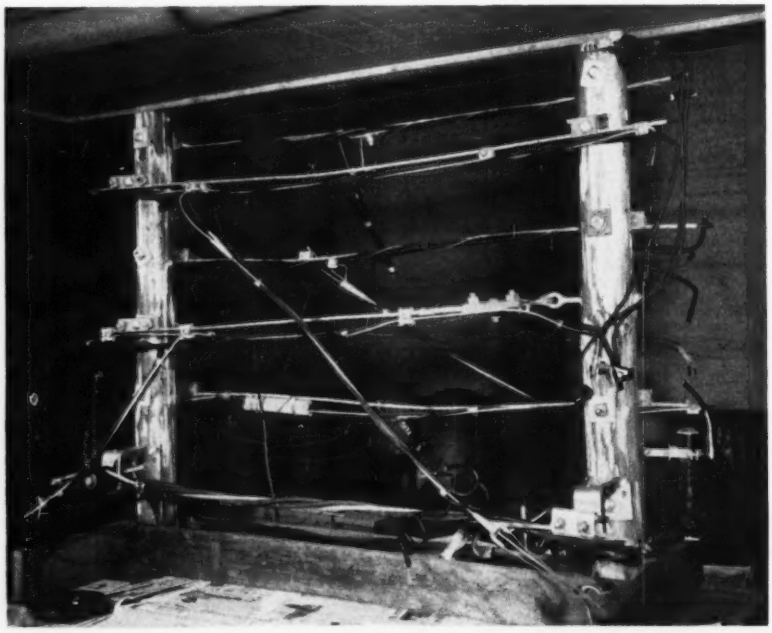
M. D. Duffy

Superintendent, Northwestern Division
Pacific Power & Light Co.
Portland, Ore.

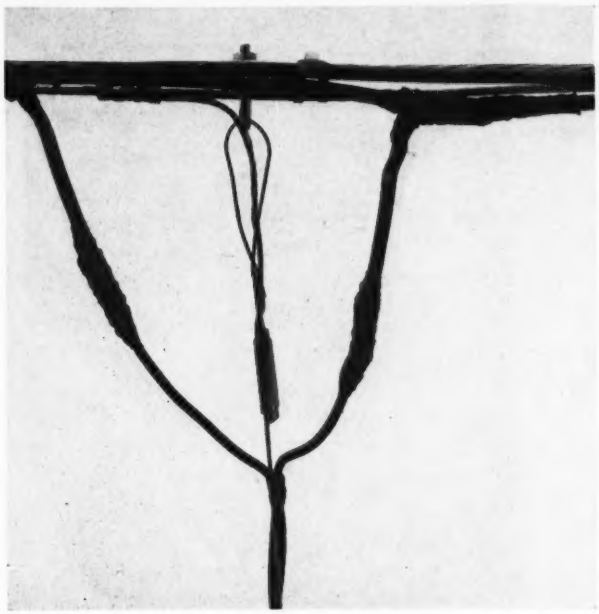
Pressure from subdividers for streamlined rear property line construction with midspan services crossing only the property of the customer served has led the Pacific Power & Light Co. to use aerial secondary aluminum cable and triplex services in serving new residential tracts in Portland. This type of construction being quite new, the company sought to determine the best construction methods to use, based on the experience of two other utilities in the West.

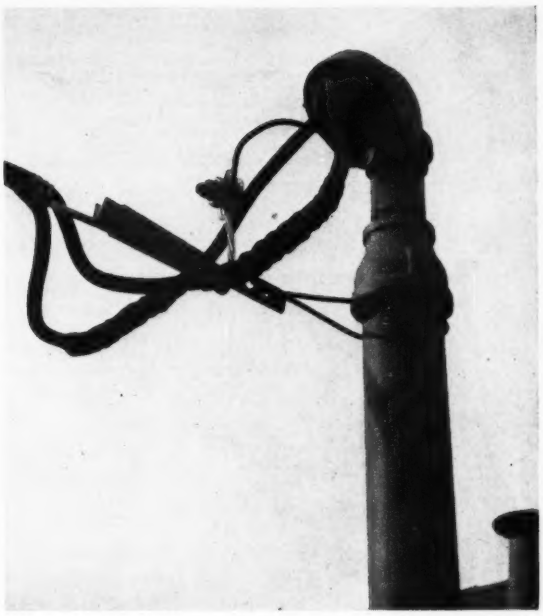
Types of Cable

The first step was to make up samples of four types of field-spun secondary cables with various methods of tapping off services and to place these on a display board. This display was then studied by line foremen as well as the engineering department, taking into consideration labor and material costs, maintenance and reliability.



Before deciding upon what type of spun cable to use and method of tapping off services, sample rack was made up so engineering and line departments could compare methods





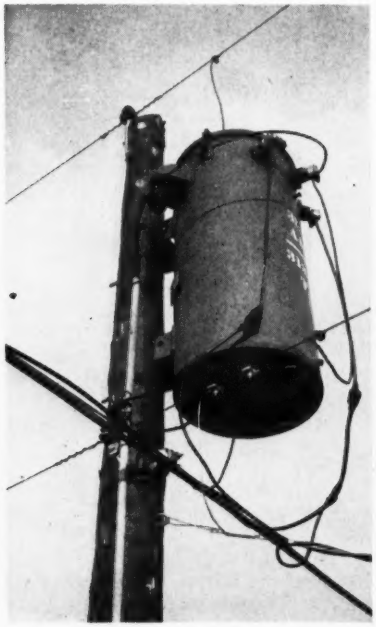
Pigtails for midspan services are placed on cable before erection. At house end bail of automatic dead-end is placed on conduit

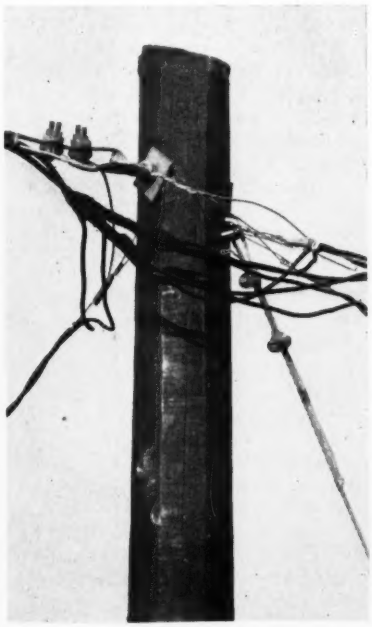
Three types of cable were considered:

1. Stranded steel messenger with bare aluminum neutral and two neoprene hot insulated legs spun on with a Neale spinner.
2. ACSR messenger - neutral with two hot legs.
3. Copperweld messenger - neutral with two hot legs.

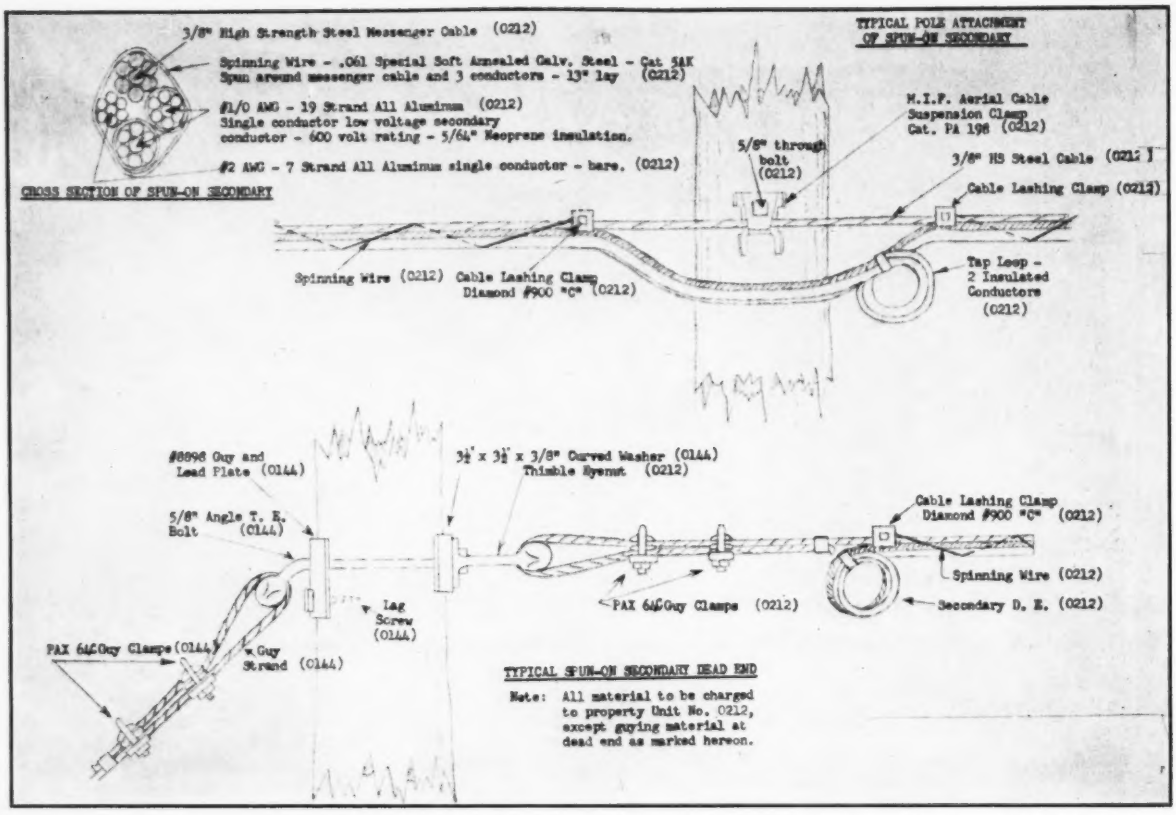
Midspan Taps

Means of tapping off midspan triplex aluminum services was a primary consideration in selecting the type of cable to use. Arizona Public Service Co. developed a special take-off clamp for ACSR, ELECTRICAL WEST, April 1953, p 90. If a steel or Copperweld messenger is used, the triplex bare neutral of the service can be anchored with a flexible bail automatic dead-end with half-hitch around the messenger. With a steel messenger, it is necessary to have a bare aluminum neutral and the cost—labor and material—of this construction has to be weighed against the use of an ACSR combination messenger-neutral or other alternate method.





Pole mounted transformer, ridge pin primary and secondary cable, left, make good looking job. Center shows dead-ending of secondary cable and triplex service take-off. At right, making a midspan triplex service tap from platform of industrial monkey


3/8" High Strength Steel Messenger Cable (0212)
Spinning Wire - .061 Special Soft Annealed Galv. Steel - Cat 5AK
Spun around messenger cable and 3 conductors - 13" lay (0212)
#1/0 AWG - 19 Strand All Aluminum (0212)
Single conductor low voltage secondary
conductor - 600 volt rating - 5/64" Neoprene insulation.
#2 AWG - 7 Strand All Aluminum single conductor - bare. (0212)
CROSS SECTION OF SPUN-ON SECONDARY
TYPICAL POLE ATTACHMENT OF SPUN-ON SECONDARY
M.I.P. Aerial Cable Suspension Clamp Cat. PA 198 (0212)
5/8" through bolt (0212)
3/8" HS Steel Cable (0212)
Cable Lashing Clamp (0212)
Tap Loop - 2 Insulated Conductors (0212)
Spinning Wire (0212)
Cable Lashing Clamp Diamond #900 "C" (0212)
#8898 Guy and Lead Plate (0144)
3½" x 3½" x 3/8" Curved Washer (0144)
Thimble Eyenut (0212)
5/8" Angle T. E. Bolt (0144)
Cable Lashing Clamp Diamond #900 "C" (0212)
Spinning Wire (0212)
Lag Screw (0144)
PAX 6A Guy Clamps (0212)
Secondary D. E. (0212)
PAX 6A Guy Clamps (0144)
Guy Strand (0144)
TYPICAL SPUN-ON SECONDARY DEAD END
Note: All material to be charged to property Unit No. 0212, except guying material at dead end as marked hereon.

Cross section showing composition of spun-on aluminum secondary cable, typical pole attachment and hardware details of dead-end

Cable Adopted

After consideration of all factors, a decision was reached, at least for the first installation to be made by Pacific. The cable consists of a 3/8-in., seven-strand, high-strength messenger with No. 2 bare aluminum neutral and two No. 1/0, 5/64-in. neoprene-insulated hot legs. These are spun into a cable with a Neale spinner, using the manufacturer's No. 5AK (.061 in.) soft annealed galvanized steel wire. Hardware and other details are shown in the accompanying drawing.

Span lengths average 250 ft, using 40-ft poles, joint with the telephone company. Transformers are hung with through-bolt mounting. Where primary is single phase, as is usually the case, a pole-top pin is used, the neutral being common for both primary and secondary. Design loading for the secondary cable is 1 in. of radial ice with a 10-lb wind.

Neatness of this type of construction is shown by one of the accompanying photographs. Promoters of new housing projects like the streamlined appearance.

Where triplex service wires take off from a pole, a Fargo service cable dead-end No. SDE-A-4 is used. The bail is hooked over a large drive hook driven into the pole. If the service takes off midspan, the same Fargo dead-end is used and the bail wrapped once around the steel messenger.

A feature of Pacific's cable construction is that the hot legs are tapped and pigtails left opposite where services will come while the wire is laid out on the ground before erection and spinning. This avoids having to spread out, skin and tap the hot legs of the cable when connecting a service. Moreover, it provides a means of disconnecting a service if occasion arises.

Compression Joints

For tapping the 1/0 aluminum pigtails to the 1/0 aluminum hot legs, 4-in. lengths of Nicopress No. 3/0 repair sleeves are compressed onto the wires to make the joint. Connections between the triplex service and the line wires, both hot legs and neutral, are compression joints using 2-in. sections of Nicopress repair sleeves.

At the house end of services the bail of an automatic dead-end may be placed around the service conduit, as shown, placed through the eye of a screw knob or fastened as circumstances call for. Connections between the copper service wires and the aluminum triplex are made with No. 2-204/7P galvanized Nicopress sleeves compressed with Nicopress tool.

All taps and splices, wherever made, are coated with Penetrox-A inhibitor and wrapped with Okoprene splicing tape.

Trial Installation

As first stated, this type of construction is new to Pacific Power & Light and as may be inferred the company is feeling its way, taking advantage of the experience of other utilities and attempting to work out problems as they arise. As indicated, there were factors other than cost that led the company into this type of construction. On the matter of cost, no attempt at comparisons have been made yet. It is felt, however, that as workmen become more familiar with the work and experience is gained the cost may compare very favorably or even be less than with conventional 150-ft span construction using crossarms and open wire.

The construction methods herein described are not necessarily the final answer. They are presented here, however, in order that the thinking of one more utility may be added on the problems involved.

Television Techniques (Third of a Series)

Mrs. Cleo Filsinger Pacific Gas and Electric Co., San Francisco Division

Recipes can be placed on a blackboard or large print used on a card in plain view of the viewer so that recipes do not have to be repeated or read. The viewer can copy them without missing an ingredient or so. This saves time on a short commercial. This is a TV technique, which can't be used on radio. Avoid the use of charts.

Paint the insides of bowls to give a contrast between bowl and food. Good for flour or light colored cheese, etc. Green or blue are good colors to use.

A sponge cake with green filling is just as good as bright red peaches or blue orange sections.

White pastry is lost on a white board, so you cover your board with a green or blue cloth or dye your cutting board with vegetable colors for contrast.

Color food as a last resort. The right color can be set off with dishes and accessories.

Brown gravy looks more real with some kitchen bouquet added.

Use a drop of yellow in the milk for the cream sauce.

Big chunks of tuna look better than small ones.

Contrast mayonnaise on pineapple by outlining the mayonnaise with rings of maraschino cherries.

Remember parsley, watercress, broccoli, and spinach go black.

Cheese, butter, or margarine go white.

Use rubber spatula and wooden spoons whenever possible.

Use rubber mats beneath mixing bowls and dishes to eliminate sound.

Never run a mixer over one minute at any one time; don't talk while running mixer; stop mixer and scrape bowl or give directions to break up the sound.

Avoid the crumpling of paper; *sound* picks up and magnifies the noise.

Be neat, clean up after the preparation of each recipe.

Don't have a stack of dirty dishes piled up on your table or behind you on the sink.

Keep a towel with one end dampened handy to wipe your hands on.

Keep paper towels handy for wiping up spillage, etc.

Try to maintain a neat table and don't have large containers or supplies to the front of the table that might obstruct the view of a close-up.

Let the director and the cameraman anticipate your movements from table to range to refrigerator to sink so that the cameraman can follow you. Do this by saying in advance, "I am now going over to the range and put this cake into the oven and set the timer for 25 minutes." Then move, and not before.

If you want a close-up of the recipe you are preparing, hold it there until the cameraman can focus the camera on your product. Don't move too fast, watch and work with your director at all times.

Label items to help the audience keep track of what you are doing.

Appliances that shine should always be dulled to eliminate "flare." Rubbing the surface with soap will accomplish this.

You can often increase interest by using glass bowls and baking dishes. The camera can shoot right through the glass so you can demonstrate the correct texture and consistency of batters.

Experience at setting up food photographs can be used to advantage in television.

Selection and Display of Foods

Extensive experience has shown that virtually every type of food can be pictured successfully on television.

Select foods that give you an opportunity to bring out the maximum number of features of the product you are demonstrating.

Select foods that will give an eye-appealing display as well as a balanced meal.

You cannot count upon the television camera to give true color values. Color responses with a TV camera are not so true or so dependable as the color values of a black and white photograph. Colors will often blend together. Red is particularly tricky. A maraschino cherry will come out almost black.

Consider the shapes of food for interest rather than contrasting colors. There are various ways of assuring contrasting colors. If you wish to show two varieties of soup or puddings, choose a light color for one kind and a dark color for the other. If the two are similar in color, you can add a vegetable dye to one to increase color contrast.

Because of the lack of dependable color separation, the selection of interesting serving dishes and the creation of interesting food patterns are important. Solid color pastel dishes are best. Patterns of floral designs will distract the eye from the foods. White dishes should be avoided because they reflect back too much light and cause a "flare" or "black halo" to appear on the screen.

Light colored foods will show up best on dark dishes. Dark foods show up best on light dishes. Try dishes out before the camera to see which gives better pictorial results.

Clothes and Make-up

Clothing: Wear pastel dress or blouse that is either solid colored or a neat print.

If a white uniform is to be worn, gray it first. In most cases they are too severe and strong for television. They give the appearance of a laboratory technician. White also causes flare in camera pick-up, resulting in a black halo appearing on the viewer's screen.

Avoid plaids, large figured materials and dresses with too much detail. Keep the line of the dress simple. Becoming necklines and straight lines are best. Avoid wearing black or navy blue as they give fuzzy lines to your figure.

Purple gabardine or wool televises well. But purple rayon crepe sets up light reflections. Hence, the same color in different materials reacts differently on the screen. Gray wool in certain shades televises well.

Change your dress or apron often for interest and variety if you are giving television shows daily or weekly.

Avoid jewelry and earrings that might cause a flash or flare in camera pickup. A diamond or jeweled ring causes considerable flare.

A short neat hair-do is preferable.

Make-up: Because of the difference in lighting and in camera equipment, individual stations have their own rules or suggestions on make-up. Always consult the director of the program on which you are to appear, for his advice.

Make-up, however, is essential for some types of people. It depends upon

your own coloring and personality. Personally, I think everyone looks better with some make-up.

Remember, a television camera is never flattering.

Signals

Below are some of the commonly accepted signals:

Speed-up: A winding motion with the hands, followed by holding up of fingers to indicate the number of minutes you have ahead.

Time Cues: To help you keep track of the time, your signal man will hold up fingers at regular intervals to indicate the number of minutes left.

Wind-up-and-cut: A winding motion of hands followed by a cutting motion of the hand across the throat. This tells you that it's time to say a few closing words and stop.

Camera: Your director or cameraman will point to whichever camera is being used, and this will be indicated by a *red light* glowing on the camera in use. Be ever on the alert for quick camera changes.

Busy: Television has a word for anything that is so elaborate or fussy that it does not photograph well. The word is "busy." When you are told something is "busy" you quickly take steps to make it simple.

The Script

It depends upon studio policy whether you are expected to write a script yourself or just jot down what you plan to do.

A written script does provide camera cues and shows the sequences of happenings, and gives a general idea of what is to be said.

For how-to-do-it programs, dialog is not usually memorized word for word. But when it is written out and the action is practiced, the timing is better and the show seems to move smoothly.

• **Montgomery Appliance & TV** is the new name for retailing operations of Montgomery Electric Co., Portland, which has moved into a redecorated store at S. W. Fifth and Salmon St. New manager, **John C. Richardson,** who joined the firm after 20 years in wholesale and retail appliance sales in California, reports lighting fixtures and small electric appliances have been dropped and emphasis will be on television receivers and major appliances. Store layout features a TV salon and doubled space for service. **Mrs. Geraldine Dotson,** for many years in the laundry equipment field, has been named home service counselor. The Montgomery Electric name will be continued in the firm's contracting operations.

S. F. Examiner photo

Yuletide scenes like this one in San Francisco are aim of Outdoor Christmas Tree Assn. of California in promoting its annual . . .

Holiday Lighting Program

The Outdoor Christmas Tree Association of California this year has launched its 18th annual holiday lighting program under the sponsorship of the State Chamber of Commerce and with scores of local chambers of commerce, civic clubs, women's organizations and many other community groups cooperating.

Said to be the only organization of its kind devoted exclusively to the promotion of outdoor holiday decoration and illumination, the Outdoor Christmas Assn. was founded in 1926 by the late Clarence F. Pratt of San Francisco, who conceived the idea when his own outdoor lighted tree on a hill in the St. Francis Wood district brought pleasure to a sick child in the neighborhood. Pratt spent many years developing the association by organizing local groups, speaking at meetings throughout California, writing articles for newspapers and magazines, and giving away many thousands of small living Christmas trees to people all over the world.

Annual campaigns have been held since the founding with the exception of the years during and immediately following World War II, when, for obvious reasons, the association's work was dormant. Through its activities, interest of communities in lighting contests has been stimulated until almost every city participates in some type of competition. Last year the association contacted, personally or through correspondence, some 150 sponsoring organizations throughout northern California alone. Through them the association distributed approximately 5,000 pieces of literature published by manufacturers of Christmas tree lamps and equipment.

Although it is difficult to measure exactly the results accruing to the electrical industry from the activities of the Outdoor Christmas Tree Assn., it is evident that the consumption of electricity and the sale of outdoor lighting equipment have both increased to a marked extent through this inexpensive, yet tremendously effective, promotion. An effort has been made to divorce the movement insofar as is possible from its source of revenue, the Northern California Electrical Bureau, in order to eliminate any tinge of commercialism. By so doing the association has been able to interest social, civic, and club leaders in becoming officers and members of its local and state board of directors.

In addition to the sponsorship of the California State Chamber of Commerce, the Outdoor Christmas Tree Assn. has been endorsed by the California Federation of Women's Clubs, the Native Daughters of the Golden West, and hundreds of local women's clubs, garden clubs, and other interested organizations, who plan special talks on lighting and encourage their members to cooperate with the association in its work.

ELECTRICAL WEST Sales Guide

News Letter

1953

©

FOR THE ELECTRICAL MERCHANT OF THE WEST

All the appliance business is hoping that Santa Claus will be good to it this year's end. Dealers have been playing it close to the belt, to the distress of some distributors. Manufacturers are watching holiday business as an index of next year's prospects. Everywhere there is more advertising, promotion and display. The total for the year has not been bad--just a shade below last year and better than '48, which is a lot of business.

Self-protection

Interesting is the spurt in growth of dealer association membership. National Appliance & Radio-TV Dealers Assn. reports many new chapters formed including one in San Francisco, which elected Clarence E. Dulfer as president, W. O. Saxe v-p, Jack Dreyfuss of Wisnom Appliance, San Mateo, as secretary and a strong board of directors of top appliance firms. This is one of many. Evidently dealers who never felt the need for organization before are huddling now to call signals on the game.

Selling together

Mass promotion becomes more important. For this the electric leagues are fronting drives everywhere. Even Honolulu, where the industry works together as the PCEA Electrical Living Committee, has a car card and ad campaign on electrical housewares as "Gifts That Keep on Giving." San Diego has just completed holding its biggest annual Electrical Exposition and has gift advertising running strong. Los Angeles Electric League has been running a "Steps to Profit" course and is helping dealers counteract the color TV "wait and see" roadblock with window "telegrams" to tell the facts about this new promise. Similar action was taken by Northern Calif. Electrical Bureau and Inland Empire Electric League. The latter is hot on a range and water heater campaign among nonusers, electric heat promotion, sales training. In Arizona appliance shows have been making the small towns. In Utah the Intermountain Electric Assn. and Utah Power & Light have a gift suggestion campaign going to promote all appliances. Probably there are several others.

New patterns

Distribution costs more than manufacture of an appliance. A TV set can be produced for $165 including the maker's profit but costs $165 to stock, ship, warehouse, advertise and sell. What's going on now is a gigantic upheaval in an attempt to cut distribution cost. Last month saw these moves: General Electric will make direct shipments of mixed carload lots to dealers from Louisville to cut freight and warehouse costs. It won't cut out the distributor though. . . Hotpoint, after being the other way, under new leaders advises distributors to prune dealers to fewer but better. . . Avco's Security Plan revolves around greater selectivity of dealers under district managers.

Price quake

Westinghouse caused something of an earthquake when it dropped prices on its entire TV line. The idea seems to have been to let dealers offer specials on three models but make up on the others, but few held prices at list on any models. Then came announcement by Wesco it would raise dealer costs by 5%. Most other makers declared they would hold the line. However, Hallicrafters cut price on four TV sets, Muntz TV on four sets. Raytheon had reduced the prices on 20 sets in October. Motorola distributor Kierulff & Co. offered instead heavy trade-ins on 24- and 27-in. sets. Philco, however, raised $10 on three models.

Ups and downs

Other price changes included reductions up to $50 by Gibson on freezers. Fedders reduced its regular line of room air conditioners from $10 to $30 at retail when it announced reversed-cycle heat pumps at $50 extra on 3/4- and 1-ton models. Westinghouse reduced Laundromat and clothes dryer $50 and $30 respectively. Apex, however, raised $10 per unit on wringer washers. G-E reduced heat pumps from 20 to 25%.

New leaders

George Cornforth, Phoenix dealer, was elected president of Appliance Merchandisers Assn. for 1954. Bill Hessler, Midland Specialty Co., is v-p, Dick Bernard of Glendale Appliance Mart secretary, and Leon Black, Black & Ryan, treasurer. Jim Donohue has been president in 1953; Bill Johnson is manager. A calendar of promotion events for '54 is under preparation as well as a product and dealer catalog.

Showcase rooms

An idea kitchen was shown in an open house to which the public was sent invitations by the Department of Water & Power, Los Angeles, Nov. 9-10. It was a "life-size showcase of unusual materials and original ideas combined into an interesting model kitchen, dining area and patio."

After bigger slice

Richard J. Sargent, Westinghouse's manager of major appliances, told a Western distributor meeting in San Francisco, Nov. 23, that the company will boost its appliance output about 30% in 1954 and the West is an outstanding market. With him for the distributor meeting were George H. Meilinger, household refrigeration manager; H. F. Hildreth, manager, refrigeration specialties; Robert P. Brook, electric ranges; Frank A. Lowery, dishwashers and food waste disposers; John D. Lee, refrigeration sales training; Douglas Kelty, vacuum cleaners; J. G. Baird, sales promotion. Walter T. Baker, appliance manager, Pacific Coast district, presided. Distributors included Hawaiian Electric Supply, Distributors Inc. of San Diego, Saviers Electrical Products, Reno, Wesco from Seattle, Tacoma, Yakima, Spokane, Butte, Boise, Phoenix, Portland, Salt Lake City, Los Angeles, San Francisco, Oakland, Fresno and Sacramento.

Financing

A new financing corporation has been set up by Borg-Warner as B-W Acceptance Corp. and will finance Norge Division retailers with floor plan inventories and paper on a dealer credit.

Musical chairs

Distributor changes noted: Magic Chef range line, including an electric now, formerly U. S. Grant Supply in San Diego, now Electric Supplies Distributing Co. . . Gold E Distributors retired from the field. Its Mercury TV line goes to Kertson & Daniel Distributing Co. . . . Ray Thomas Co. of Los Angeles started a San Diego branch to represent CBS-Columbia, Deepfreeze, James and Mitchell at 820 W. Ash St. . . Gordon E. Wilkins Inc. has been dissolved and United Western Distributors handles the same major lines at the same 2135 E. Seventh Place address, Los Angeles. These include Hamilton, Ironrite, Geneva and Harder Freez. Frank Tschannel is v-p and s-m, George Sink, v-p and sec. Tschannel was formerly with Hamilton, Sink with Tyler Fixture Corp. Wilkins holds a minority interest on an inactive basis. . . Raytheon named Valco Distributors, Spokane, to replace Tri-State Distributing Co.

More moves

More distributor changes: Harry Dooley & Co. takes over the Motorola distribution in San Joaquin Valley in California, formerly handled by Kierulff & Co. Kierulff gets from Blythe to Riverside from Arizona Wholesale of Phoenix. Schafer-Wright Inc. of Portland now handles Youngstown Kitchens for Oregon and southwestern Washington. . . Admiral Corp. has established a factory branch known as Admiral Distributors Inc., Alaska Division, at Anchorage, with William W. Winkels as manager. . . Tay-Holbrook Inc. is distributor for Chrysler Airtemp products in northern California and northern Nevada, with headquarters at 165 Eighth St., San Francisco, and 12 branches. . . Western Empire Distributors, handling Sylvania, has opened a branch at Front & N Sts., Sacramento. . . A. O. Smith Corp. has appointed Ray Thomas Co. in Los Angeles as water heater distributor. . . Robert L. Rice Co. handles James dishwashers in Oregon, succeeding Harper-Meggee Inc. Glen Sandstrom of the latter joined Rice to handle this line. . . Holliday Distributing Co., Albuquerque, is the new Amana freezer distributor there. . . Leo J. Meyberg Co. has opened a branch office at 1730 Eighth St., Sacramento, with Tex Welch in charge. . . Great Western Fuel Co. is the new CBS-Columbia distributor in Spokane. . . Empire Brass Co., Vancouver, B. C., will handle Murray Corp. of America kitchens in British Columbia and Alberta.

New jobs

Men still move: C. M. Hoover was appointed Western sales manager for Norge. . . Marshall Wells, who has been general sales manager of Golden State Appliance Distributing Corp., was appointed v-p of Admiral Distributing Corp., Dallas branch. . . George W. Clausen has been appointed western district sales manager for Manitowoc Equipment Works to cover California, Arizona and Nevada. . . At Utah Power & Light, De Lamar Holt, formerly of Western Colorado Power Co., is now residential and farm director succeeding the late J. F. McAllister. . . Herman Kaye resigned as secretary at Kaye-Halbert TV Corp. . . Edward A. Altshuler, former national marketing director for Kaye-Halbert, is now with Berlant Associates, makers of tape recorders. . . Howard L. Bredlow, formerly Hoffman Radio, Santa Barbara, now is district s-m for Magnavox in the San Joaquin Valley. . . P. G. McCauley was recently made district merchandiser for Stromberg-Carlson in the Northwest, including Oregon, Washington, part of Montana and Idaho, and Alaska, with residence in Spokane. . . John B. Lang, Houston Tex., has joined Frank Edwards Co. as sales manager for San Francisco and Oakland for DuMont TV. . . Manny Silver, former s-m for Pacific-Mercury, is now with Philco-Los Angeles. . . Tucson Appliance Merchandisers Assn. named Raymond G. Cox as its business manager. . . Edward B. Munsey has been named by W. J. Lancaster Co., San Francisco, to represent it on Servel, Motorola, Thor and Eureka in the San Joaquin Valley. . . T. C. Gilliland returned from the U. S. Navy to be San Francisco district manager for G-E radio and TV.

Appliance gossip

New in appliances: Packard-Bell plans to put out a room air conditioner. . . Thermador has added two Bilt-In range tops to its line, both 30 in. long by 21 3/4 wide, one with a deep well cooker. . . Free Sewing Machine has a new model combining a drop leaf table with concealed sewing machine. . . Rheem Mfg. Co. will be making air conditioning units soon. . . Utility Appliance, which now owns Bauer water heater, soon will bring out an electric water heater under the Utility label; and plans a window air conditioner (refrigerated) line in 1954. It pioneered the evaporative cooler. . . Proctor has dropped its electric blanket line. . . Astral, the only other bantam refrigerator, is in receivership. . . Others soon to make window air conditioners--Lewyt will make for private brands; Olympic Radio-TV will be in the market; Amana will have a year-around type; Perfection Stove also will be in it. . . Sunbeam has introduced a line of electric blankets.

Color scramble

Color TV still has the industry in aberrations. Eagerness of the press for new things to tell gives a sense of urgency for color that probably doesn't exist. NBC's national coast-to-coast demonstration of RCA compatible color, Nov. 4, got wide publicity. CBS set a price of $125 for its Hytron color tube in 15-in. size. RCA's color tube has been started in pilot production by National Union Radio Corp. RCA also claims it has developed magnetic tape recording of TV and color. Crosley has been licensed to produce the Chromatron tube of Prof. E. O. Lawrence, U. C. It uses a single electron gun. DuMont will start producing larger color tubes by next summer. Big department stores are said to be pressuring for color TV; RETMA plans a consumer booklet on color TV early in the year.

"Don't wait"

Meantime, the electric leagues in the West, almost to a man, have advertised that color sets are still a year or two off and will be costly, to counteract the tendency to wait-for-color deterrent, which may be hurting present b&w sales. Although set sales have increased in all Western markets during the past three months, Los Angeles sales dropped in October. Recent surveys show there are 500,000 sets under 14 in., making a tremendous market for replacement there, however.

Restraint illegal

Federal judge in Philadelphia upheld the Justice Department's antitrust case against the National Football League. Importance of this is that any station can now negotiate for broadcasting of local games.

Other TV news

Police and FCC are aroused over some of the false and misleading advertising done over TV in Los Angeles and police have called for a seven-station code of ethics. . . In San Diego the Better Business Bureau and legitimate repairmen are combating a TV service racket by ads, a TV and appliance service code, identification cards for qualified repairmen and a service booklet to the public. . . Idaho Falls has a licensing and bonding code for TV installers as a new station, KID-TV, starts operating with the former KSL-TV transmitter from Salt Lake City. . . In Denver, KLZ-TV channel 7 went on the air Nov. 1. . . In Honolulu, KGMB-TV increased power to 10 kw and with a double rhombic antenna later will reach across the Pali. . . A new microwave relay system will be installed in Casper, Wyo. . . Meanwhile, new radio and FM stations, believe it or not, are opening up, some in the Hawaiian Islands and on the mainland too.

Out West

Pioneer Electronics Corp. opened a new West Los Angeles television tube factory, the first on the Coast, to produce 1,000 picture tubes a day.

Farm topper

Marvin D. Harris of Hollister, Calif., 15 years old, was named one of six national champions in the 4-H Farm and Home Electric Program, sponsored by Westinghouse Educational Foundation.

Fair Trade cases

Sunbeam got a decision against Masters Inc., one of the largest discount houses in the U. S., for contempt of an injunction against price cutting. . . Westinghouse filed suit in Oakland against De Lanes Jewelers Inc. and got a temporary restraining order. . . In Fresno the Sylvania distributor, Western Empire Distributors, filed suit against Rex Television City for cutting TV set prices. . . Sunbeam filed in San Francisco against Sugarman Bros. and others for cutting prices in a fire sale and to army post exchanges. . . In Utah the State Supreme Court denied a petition on the trading stamp case in which the State Trade Commission charged use of the stamps violated the Fair Trade law.

Merger

Nesco Inc. has purchased Dulane Inc., makers of Fryryte, originator of the home deep fat frying appliance.

Year's Heat Pump Operation Summed Up

Those watching developments in heat pumps for residential air conditioning will be interested in results of the first year's operation of the General Electric package air-to-air unit installed in the Huckins' home in Salt Lake City. The installation was described in ELECTRICAL WEST, November 1952, p 89.

Operating data for this first year of operation are given in the accompanying table. This shows that the heat pump operated four months of the year on cooling only and the other eight months on the heating cycle. A total of 12,370 kwh was used during the year, costing $203.24, or an average of $16.10 a month. This is considered reasonable for year-round air conditioning in Salt Lake City with its 5,555 degree-day climate. Degree-days for year of the test were 4,950, or 9% below normal. The kilowatt-hour use per degree-day for the heating season was 2.359.

Booster Heaters

One of the interesting features of this heat pump is the provision made for cutting in increments of resistance heating up to 10 kw to supplement output of the unit when the temperature falls below 17°. During the test year a submeter showed that 103 kwh were consumed by the auxiliary heaters for 51 hours when temperatures dropped to 17° or lower. Maximum demand for this use was 6.6 kw.

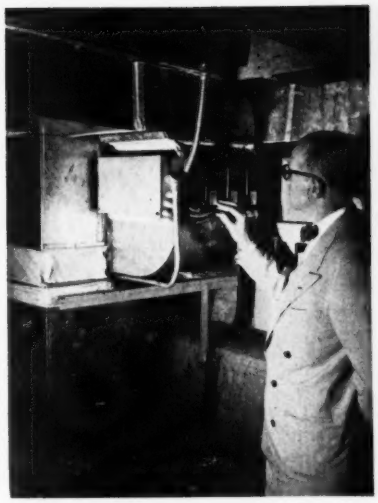
Annual load factor for the all-electric home as a whole was 18.8%. Demand on the heat pump only was metered separately and the maximum was found to be 10.32 kw, load factor of the heat pump was 13.68%.

The coefficient of performance for the heat pump is 3. With a COP of 3, then 37,110 kwh would have been required to do the same work performed by the heat pump. Another way of putting it is to say that the heat pump earned an effective rate of 1.64c divided by 3, or 5.46 mills.

The heat pump installation is in the home of W. A. Huckins, manager, business development, Utah Power & Light Co., and is being used to gather experience data for both the company and its customers.

Pertinent Data

- Six-room brick house
- Insulated and weatherstripped, with casings calked
- Floor area 1,400 sq ft
- Space heated 10,350 cu ft
- Heat loss 80,000 Btu per hour based on 5° outside temperature and 72° inside
- Normal degree-days, 5,555
- 274 hours a year when temperature is 17° or lower
- Air-to-air G-E heat pump
- 10 kw of auxiliary resistance heating in one 2-kw unit and two 4-kw units, thermostatically controlled
- Compressor motor, 5 hp, 230 v, single phase
- Auxiliary motors, one ¾ hp, one ½ hp



Resistance units boost heat pump below 17°

Energy Consumption W. A. Huckins Residence, 403 Douglas Street

Period Ending	Type of Service	Totality Meter Use Kwh	Kwh Demand	Total If Billed Under Sched #2	Heat Pump Kwh Used	Cooling Service Kwh	Heating Service Kwh	Kwh Net As Billed	Ordinary Use As Billed Sched #2 $	Net Cost Heat Pump
Sept. 4, 1952	Cooling	690	9	12.23	210	210	...	480	8.66	3.57
Oct. 3, 1952	Cooling	740	9	12.71	140	140	...	600	9.79	2.92
Nov. 3, 1952	Heating	1,110	9	18.45	530	...	530	580	9.61	8.84
Dec. 2, 1952	Heating*	2,640	12	46.30	1,910	...	1,910	730	11.21	35.09
Jan. 3, 1953	Heating**, Heating***	2,800	10	46.38	2,260	...	2,260	540	9.23	37.15
Feb. 1, 1953	Heating	2,510	9	39.79	1,940	...	1,940	570	9.51	30.28
Mar. 4, 1953	Heating	2,880	9	46.43	1,880	...	1,880	1,000	15.48	30.95
Apr. 2, 1953	Heating	1,920	8	29.44	1,260	...	1,260	660	10.36	19.08
May 2, 1953	Heating	1,830	9	29.25	1,150	...	1,150	680	10.55	18.70
June 2, 1953	Heating	1,500	8	23.39	750	...	750	750	11.53	11.86
July 3, 1953	Cooling	560	7	9.41	110	110	...	450	8.37	1.04
Aug. 5, 1953	Cooling	600	9	11.38	230	230	...	370	7.62	3.76
Total		**19,780**		**325.16**	**12,370**	**690**	**11,680**		**$121.92**	**$203.24**

*80 Kwh used by resistance heaters during this period.
**23 Kwh used by resistance heaters during this period.
***Thermostat set to maintain 65 F (instead of 72 F) from Dec. 19 through Dec. 30, as Huckins' were out of town.

Total cooling service ..... **690 kwh**
Total cooling service cost **$11.34**
Total heating service ..... **11,680 kwh**
Total heating service cost **$191.90**
Average ¢ per kwh used ..... **1.64¢**

ELECTRICAL WEST

Hells Canyon Won't Go to Hell

WITH all the hue and cry about a private power grab on Hells Canyon, some might be led to believe that Idaho Power was going to steal the power and abscond to parts unknown. That's just plain silly, of course. To try and create that impression in the public mind is nothing but politics and subterfuge.

Snake River power is a natural resource that will inure to the benefit of all the people, no matter who develops it. Dams and power houses look alike and operate alike irrespective of whether they are built with the nation's tax dollars or private investors' risk dollars seeking a reasonable wage.

Cost of power is about the same no matter who develops it. The essential difference is that with subsidized federal power the nation's taxpayers are helping to pay the power bill of those in the given area, whereas with private capital power costs stand on their own feet; the utility pays huge taxes and consumers pay a fair price for the power they use.

Isn't it strange how the simple facts of a situation like Hells Canyon can be glossed over and misconstrued by a zealous group bent on socialized federal power?

Facts About Color TV

RECENT publicity about color television has confused the public and at the same time almost completely disrupted TV sales at a time when dealers expected peak volume. While it is a fact that the color television timetable has been stepped up, the public and many people in the trade are unaware of the current outlook. Just because compatible color and black and white TV is feasible and broadcasting standards may soon be approved by the Federal Communications Commission, the public should not be made to believe that universal home color TV is ready here and now.

By way of arming dealers with information to show that black and white TV will not be obsolete in the near future, Robert S. Bell, executive vice-president of Packard-Bell, points out these significant facts: Economical home color TV is two years away. The present picture size is small—11½ in. wide. Color tube replacement costs approximate $350. A color set will cost $1,000 plus or minus 20%. Maintenance costs are estimated at three to five times black and white. Color telecasting is restricted to a few stations and will be, because of cost.

Readers of ELECTRICAL WEST—all electrical experts to their lay friends—can do the industry a service by passing along this fund of factual information.

Dogs Die, Even in Mangers

THERE is a moral in the chronology of events surrounding the licensing of the Kings River development of the Pacific Gas and Electric Company by the Federal Power Commission. A license for this 241,000-kw project was issued in November 1949. Soon thereafter the Department of the Interior asked for a rehearing on the grounds that it alone was entitled to power rights in this river basin. The license was reaffirmed by the FPC in December 1951 after protracted hearings. Interior then took the case to court and a federal court found in favor of the utility. Still not deterred, Interior filed an appeal. Last month—almost four years to the day after the original license was issued—Interior (new officials to be sure) asked that its appeal be dismissed as not compatible with the new federal power policy.

The original schedule called for completion of the project in early 1954. Now, under the most favorable circumstances, it will be 1958 before the power will be available to customers. Thus four years have been needlessly wasted. Four years' output of this plant has been lost—in critical power years this might have been disastrous. Some 6,000,000 barrels of fuel oil or its equivalent must be burned to provide substitute power. And Fresno County, where the project will be located, has lost a sizable piece of tax income—at least $2,000,000.

EDITORIAL VIEWS

The "dog-in-the-manger" tactics of the bureaucrats who staffed the Interior Department during the last administration has been costly to the economy of this region. This is especially so, since the department's program for developing this power has been turned down by Congress on nine different occasions.

There is no hindsight in the observation that had conditions been reversed, with the utility attempting to block federal power development, the attendant bureaucratic clamor would have aroused the public to fever pitch. As for the moral it is this—even dogs in the manger die.

New Trees — Not Tree-Trimming

COMBINE community service, civic pride, public interest and tangible operating and financial benefits for the utility and the result is a sure-fire program. The selective tree planting program of Pacific Gas and Electric Company described elsewhere in this issue falls into that category. It is a long-range undertaking with assured benefits for community, customer and utility. Utilities are spending millions of dollars annually for tree trimming and the expenditure curve is upward. Customers complain when service is interrupted because of trees and are equally critical when trees are trimmed drastically or are cut down.

The PG and E plan proposes the planting of trees with growth characteristics that will keep them out of power lines and at the same time will conform to the best aesthetic tastes for beauty and decoration. The long-range nature of the program is evident when one appreciates that many of the types of trees must be specially developed to insure desirable characteristics as to size, growth rate and configuration.

The program merits study and emulation by power companies everywhere. The benefits are too worth-while to be passed over lightly—better customer and community relations, better service and lower operating costs.

LAST month, when news was released of a thermonuclear demonstration in Soviet Russia, a shudder went through the whole world. Yes, through the whole world, for even in the Soviet-dominated world there must now be some sharing of the dread with which this news is being met in the free world. But I would like to propose for your consideration that this recent USSR accomplishment, great as we must admit it to be, is less dangerous today for the free world's hopes for the end of Godless tyranny than would have been the case if the Soviets had announced that day that it had been successfully operating a practical industrial nuclear power plant—and was that day offering foreign nations nuclear power technology in exchange for uranium, coupled with other favorable economic and political agreements. It is no secret that our atomic weapons program depends upon the receipt of substantial quantities of uranium from foreign nations. The friendly nations, I think, are motivated mainly by two beliefs. They believe in the military protection afforded by our atomic weapon potential. But we sometimes are inclined to forget that they also are betting upon our great record of success in solving industrial and technological problems. They are banking on United States know-how and United States good faith to help them build their nuclear power plants of the future . . . Unless we embark upon an all-out attack on our nuclear power program immediately, we may be deprived of uranium ore with the result that our weapons potential will be smaller than need be the case. And so the two races —the atomic arms race and the nuclear industrial power race are strongly related.—Thomas E. Murray, Commissioner U. S. Atomic Energy Commission.

Attractive garden-type lighting treatment of restaurant exterior creates that important and necessary stop, look and enter urge

Good Restaurant Lighting Isn't Luck –

Del Reynolds
Southern California Edison Co.
Alhambra, Calif.

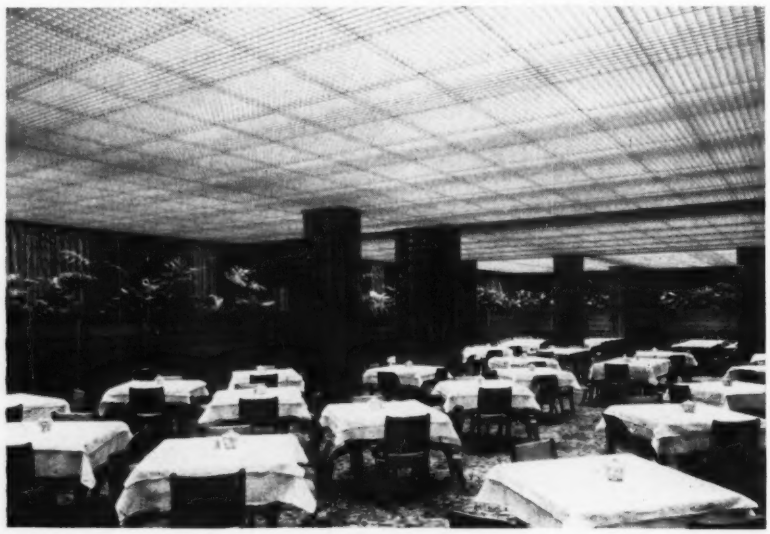
The lighting engineer is asked to solve many problems but none so complicated as in the restaurant field. There are no strict and staid rules by which he must abide. After providing light in kitchens and work areas, he leaves the field of fact to the greater area of creative design and effect. He becomes a builder in the arts. And if he is a true artist, the results will have charm and appeal as well as efficiency. If he is just a slide-rule engineer, then the results will be forced, though adequate, and the owner will have to blend the atmosphere with paint, fixtures or personality.

Restaurant lighting can be divided into three sections: First, and simplest, from an engineer's point of view, are the work areas, areas that should be equal in size to one-third at least of the dining space. These are the kitchens where a staff of trained and efficient technicians hold forth. This is treated by the lighting engineer in the same manner as he would treat any factory where critical seeing is important.

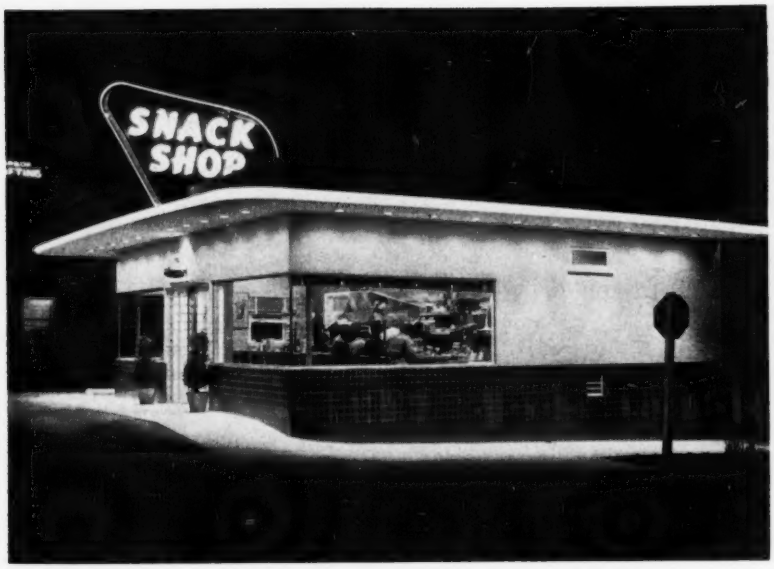
Intensities of 30, 50, 75 f-c or more are recommended. Here the problem is a fundamental one, consider the seeability, note the brightness ratio of the surrounding surfaces, watch for reflected glare from highly polished equipment, worry about shadows from the chef's hat on his working plane. Will grease vapors in contact with the lighting fixtures call for an education in maintenance? Will the heat in relation to lamp life require a study of the ventilating requirements? These and other questions are analyzed.

This area would also include halls, storage closets, the cashier stand wherever located, an auxiliary lighting system in the dining area and powder room to facilitate after-hours housekeeping and similar items. On the whole it is the same problem faced in almost every industrial lighting task, good lighting to permit the efficient handling of a job in a highly skilled industry. There is no mystery here.

Second consideration is exterior areas. These include the approach, the drive, walk, front of the building, entry, parking lot and safety lighting. These problems are handled with signs, floodlights, exterior accent lights, gar-



An all-louvered ceiling was considered most appropriate for this class of eating place



Well-lighted exterior with recessed spots create the come-in urge at this snack shop

Call a Lighting Decorator

den or planting highlights, spotlights and all the rest of the tools of the trade.

Here we must attract the eye of the potential customer. We must sell him on the idea of stopping, and of eating. Here we must create first impressions and assist the patron to make the transition easily from the hubbub of life to the tranquil interlude of dining. Whether it be at the corner beanery or at Hollywood's House of Murphy, it's the same problem.

At this point we are still on fairly solid ground because in all of our commercial lighting work we have been striving for this *look, stop* and *enter*—this transitory step in one form or another.

The third section, the dining area and bar, is a more complicated problem. There the engineer must forget that he is an engineer, he must force himself to take a minor role and endeavor to catch and interpret the thoughts of the architect and decorator. He must become a Michael Angelo with light. He must bring into being the concept of the architect with all the skill of an interior decorator. Here the psychology of color and color reflection will play a great part in the over-all results.

He must realize that low intensities of illumination cause the patron to linger over his meal. This fact can be reversed easily to speed the customer's departure by increasing the amount of light when others are waiting. The coffee shops and drug-store counters use this high level of light to their benefit through speed, efficiency and a large number of servings per seating capacity.

The restaurant operator is now increasing the tempo of his background music during rush hours to this end. There is no reason why a dimmer control could not be utilized in a like manner to increase the foot-candle level of illumination during rush hours when he wants to speed his patrons unobtrusively through their meal.

The lighting decorator, for that is what he must be, must be able to solve the many state, county and local rules, regulations, laws and ordinances that have been enacted to protect the health and morals of the public.

The National Restaurant Assn.'s slogan sums up the restaurant problem very completely: "Good Food, Pleasant Atmosphere, Good Service and Cleanliness."

It is interesting to note that, as long as the lighting fits into the atmosphere of the place, there is no intensity that is too bright or too dim insofar as the customer seems to care. But, ruin any one of the four main points of the slogan and business goes past the door.

People do not go into a restaurant and look for evidence of the lack of cleanliness, unless something has conditioned them to question their judgment in dining at that particular spot. Something has shaken their confidence —sloppy service, poor food, an unpleasant odor. And when that happens, they want more light, more security; but more light is not the solution.

A request for more light in the dining area should be viewed with alarm because it may show a decline in one of the main points of the slogan. If, however, such a request is truly just a lighting problem, the restaurant owner can consider himself very lucky because that can be easily remedied. Brighten the table area with down lights or increase the general atmosphere lighting.

Through it all there runs a bit of luck. Experience, ability, understanding and interpreting are the top tools in restaurant lighting.

With stepped-up eating tempo a higher intensity is provided with flush-mounted units

Customers entering this accounting area can see the low-brightness, high-level illumination given by Columbia indirect-type units

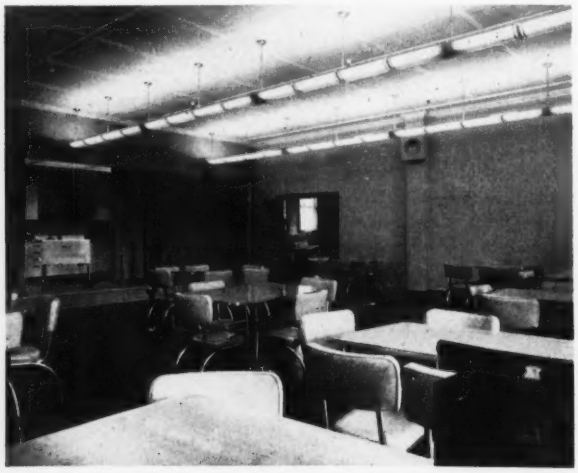
In Relighting—Practice What You Preach

This was the motto of the General Electric Supply Co. in selecting appropriate lighting equipment for its offices in San Francisco. Through past experience they realized that customer selection of lighting equipment can best be made by actually seeing the equipment in operation under normal conditions. Their building was divided into 11 sections or areas, and each lighted with a different style or type of fixture, yet at the same time maintaining ceiling continuity and harmonious balance. In addition, each of six private offices and two conference rooms have been given special treatment, each with its own type of fixture and appropriate lighting layout for the area involved.

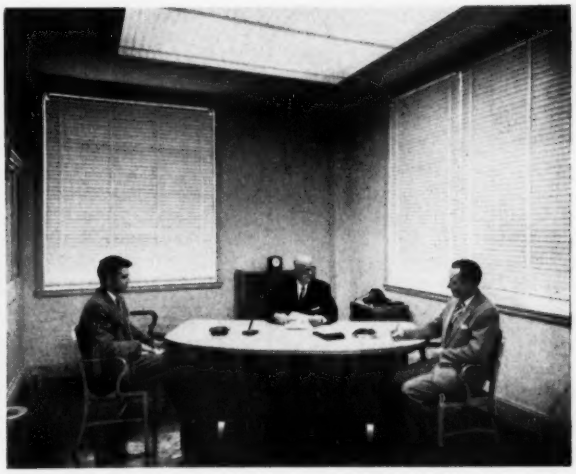
The purpose, other than providing good light, is to demonstrate to customers a representative sample of popular standard lighting equipment sold by G-E Supply and, in a natural surrounding, point out the specific features of the fixtures and layouts involved. The unpleasant confusion created by a forest of individual fixtures being displayed in a small overcrowded area has been eliminated. Instead, they have adhered to their belief that the real beauty and utility of a lighting system lies in the *area*-wide effect created by appropriate layout of fixtures, proper use of harmonious decorating colors, and the selection and arrangement of office furniture.

Selection of the desirable color of lamps has been simplified also by utilizing all white lamps on one floor, all cool white on a second floor and all warm white on still a third floor. This isolation of lamp colors likewise follows the area-wide effect rather than individual lamp comparison.

Somewhere in the building a customer can visualize his problems and obtain a preconceived idea of how a specific type of fixture and layout will appear in the solution of his own lighting problems.

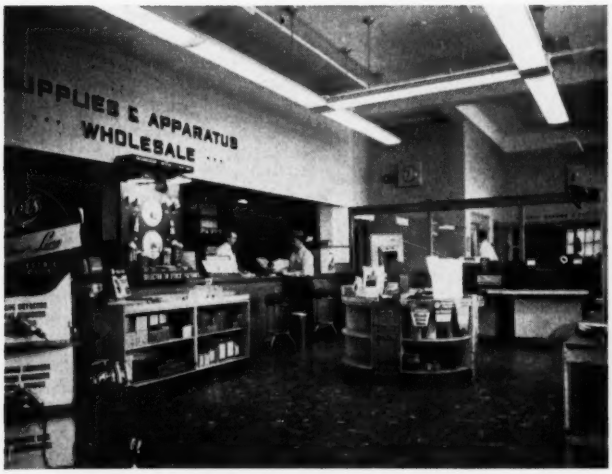


Treatment was varied for operations manager with Day-Brite Plexoline. Wakefield units are comforting in conference-lunch room

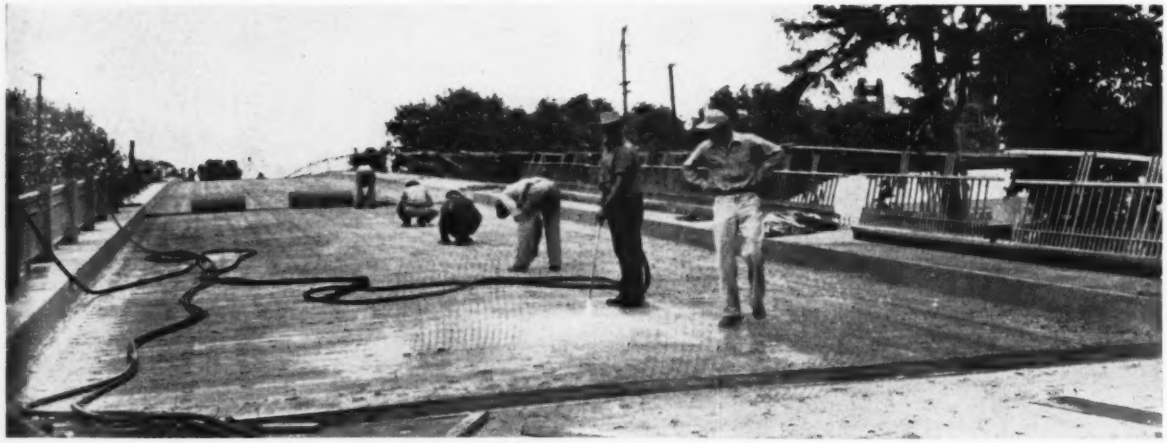


General manager delighted with 120 f-c from Columbia-Holophane units. Right: Supply sales manager prefers 100 f-c Wakefield ceiling

Miller Lexington units provide 50 f-c in the office space (left). Right: Holophane Controlens units provide 90 f-c for quotations

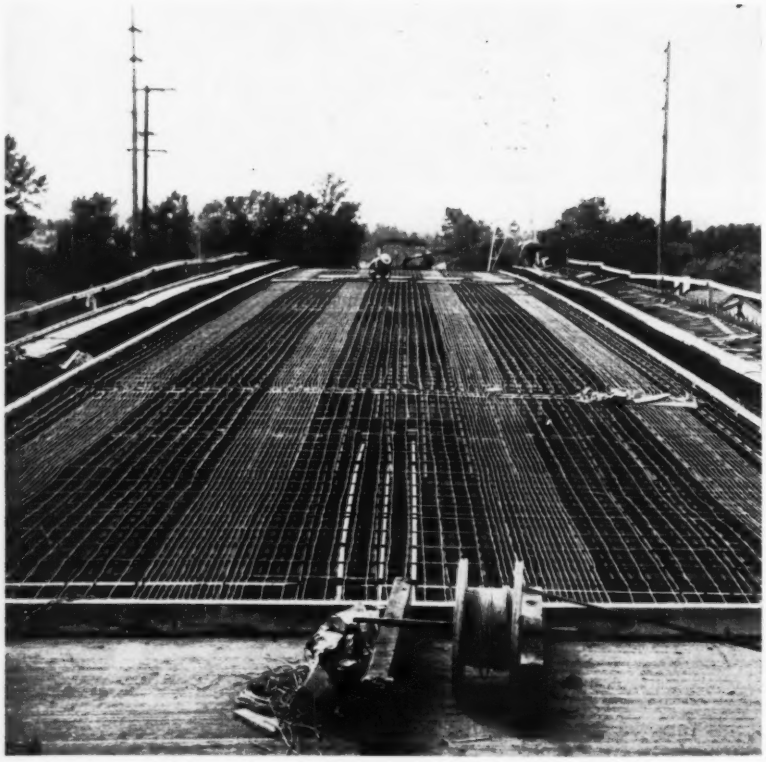


Grids and patterns of Columbia fixtures add to eye appeal of counter sales area (left) and appliance merchandising display, right



Strips of welded wire mesh form heating element on approach to Marion Street bridge installed to reduce hazards from frost and ice

Electric Heating Prevents Icy Skids



Soil heating cable is used as heating element on approaches to Center Street bridge

Electric heating will reduce hazards from frost and ice on the inclined approaches to the new Center Street and Marion Street bridges in Salem, Ore. These are believed to be the first installations of this type on the Coast and may set an example for the colder regions of the Far West.

The Center Street bridge makes use of General Electric soil heating cable. The cable is fastened to the reinforcing steel and poured into the concrete deck to finish 1½ in. below the roadway surface. Cables are spaced about 1½ in. in wheel tracks and about 5 in. in the space between.

Cable is used in 132-ft lengths and operates at 240 v. More than 55,000 ft of heating cable were installed. Operation is controlled by two bulb thermostats. One is inserted in the ground bearing slab and one in the supported slab.

On the Marion Street bridge 2x2-in., No. 14-gage welded mesh is used for heating elements. This was cut in strips 18 in., 24 in. and 30 in. wide. Wire strands were brazed at the ends to a flat bar. No. 4/0 copper cable brazed to this bar extends through a special sleeve to the underside of the slab. Heavy cable is run below the slab to the control panel. Insulated wires inserted in the concrete during the pour are spaced 8 in. laterally and 12 in. longitudinally to tie the mesh in place. Asphalt pavement 1½ in. thick was then laid over the mesh. This system will operate at about 50 v.

Connected load is 250 kw on the Center Street bridge and 250 kw on the Marion Street bridge. These capacities gives approximately 20 w per square foot on each. The systems were designed to hold temperature on the approach to a minimum of 30°.

Installation was made by W. R. Grasle Co., electrical engineer and contractor of Portland.

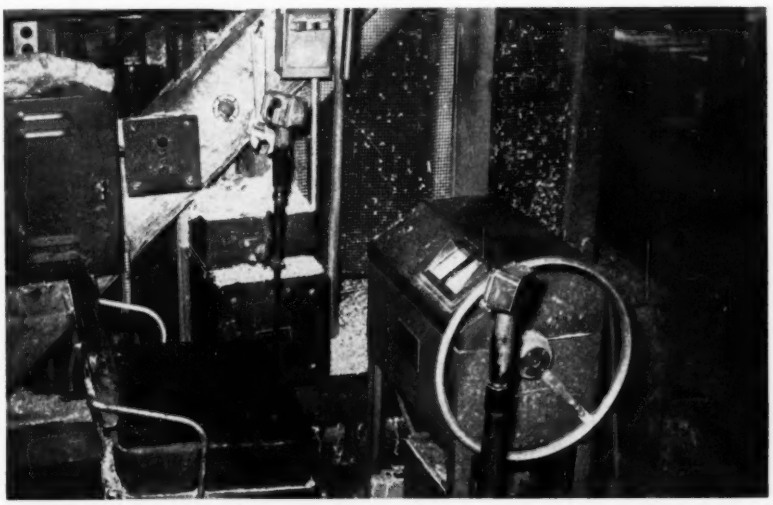
NORTHWEST ELECTRIC LIGHT & POWER ASSOCIATION

Utilization Data Sheet No. 92

SUBJECT: Electric Log Carriage Drive
CUSTOMER: P. Hammer Jr., Stave Falls, B. C.
TYPE OF BUSINESS: Sawmill
SERVICE COMPANY: B. C. Electric Co. Ltd.
DATA SHEET PREPARED BY: R. W. Racine, Industrial Representative

The electric log carriage drive now in use at the P. Hammer Jr. sawmill in Stave Falls, B. C., is an attempt to improve on the three previous electric drives used in this mill at different times in the past eight years. The first was a friction drive powered by a 25-hp motor, the second was a cone-in-cap drive on a shaft driven by a 25-hp motor and a third was a hydraulic gunshot drive powered by a 50-hp motor.

The drive currently used was installed in 1952 and is a d-c variable speed drive, essentially a combination d-c motor and generator, which replaces the clutches used in the other drive. The unit is powered by a 40-hp, 460-v, three-phase, a-c motor, schematically illustrated.

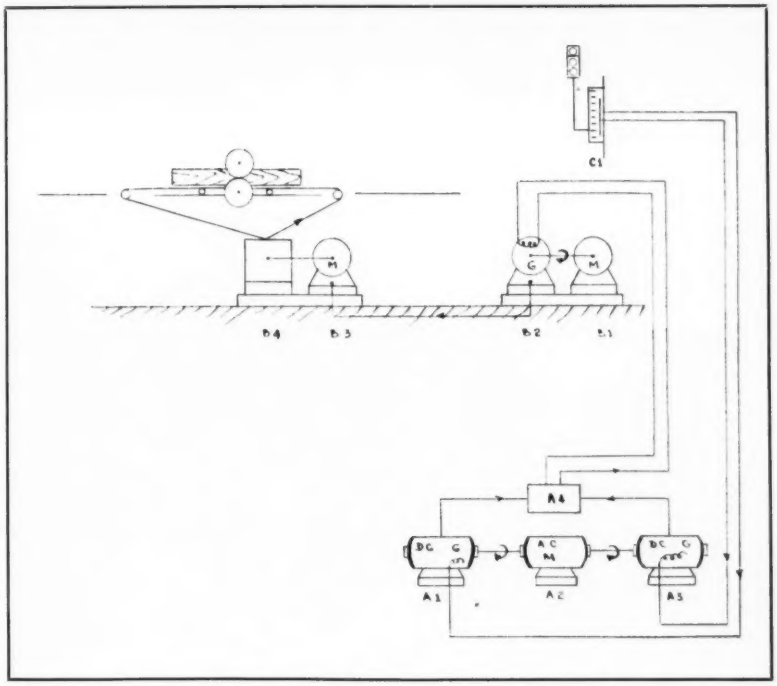


Sawyer's view of log carriage control. Rotating arm to left of chair controls direction

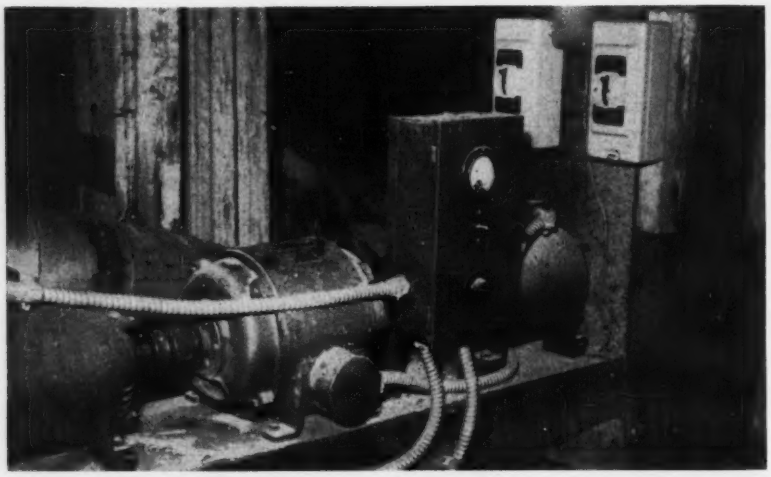
Advantages

The main advantage of this drive is its ability to convert the inertia or kinetic energy of the heavy, fast-moving carriage, as it decelerates or changes direction, to electrical energy that is dissipated as heat in the m-g set. This action replaces the destructive force that occurs when the kinetic energy is wasted as heat in wearing the friction clutches. Another advantage is frictionless braking, which occurs in the interaction of the magnetic fields of the m-g set. This eliminates wear of equipment and provides smooth, quick deceleration and reversal of direction.

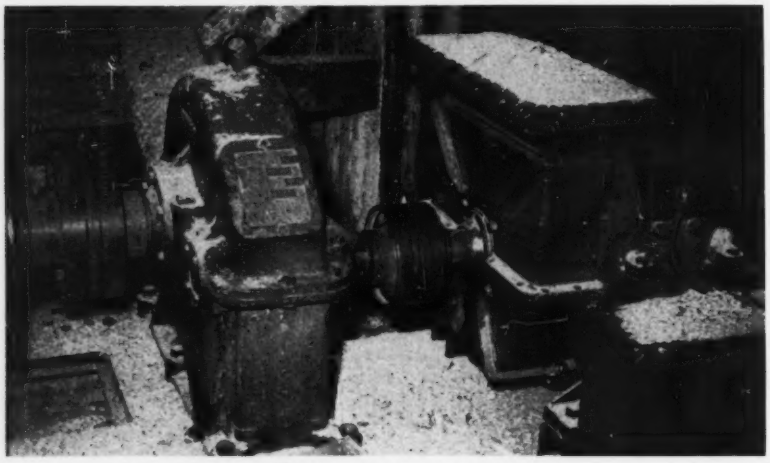
The variable speed drive is popular with the sawyer because the controls are simple, easy to operate, effortless in operation, instantaneous and reliable. The carriage control consists of a pushbutton switch on a rotating arm located to the left of the sawyer's position. This arm, designated as C 1 in the schematic, is rotated to control the speed and direction of the carriage. As the arm is rotated it operates a contactor that routes the circuit through various resistors to control the small d-c currents energizing the field coils of the d-c exciters A 1 and A 3. These exciters are powered by an a-c motor, A 2. Direction of rotation of the arm



Schematic arrangement of electric log carriage drive used in small Canadian sawmill



Three-unit motor-generator set with 3-hp motor driving two 1-kw direct-current generators supplies current for d-c generator driving carriage motor at Hammer sawmill



Main-drive motor is direct connected to 35-hp gear drive that operates drum winch

The P. Hammer Jr. sawmill in British Columbia has a capacity of 25,000 ft per day

C 1 governs the direction of the carriage by governing the direction of the d-c excitation current fed through the relay box A 4 to the large d-c generator B 2. The pushbutton switch on the arm C 1 operates the setter on the carriage.

The exciter set, A 1, A 2, A 3, is in effect a d-c current amplifier, permitting control of a large d-c generator with small current and equipment at C 1.

The d-c generator is powered by a direct-coupled a-c motor B 1, which operates constantly. B 2 generates a d-c current to drive the d-c motor B 3 when the field of B 2 is energized. The direction and amplitude of the d-c output of B 2 controls the direction speed and horsepower output of the main drive motor B 3.

Motor B 3 powers by direct coupling the gear reducer B 4, which turns the drum winch and cables, driving the carriage. The response between carriage operation and operation of the controller C 1 is considered instantaneous for the sawyer's requirements.

A retardation force is transmitted through the gear reducer to the d-c motor B 3, when the carriage decelerates. B 3 becomes a d-c generator in effect and feeds current to B 2. When the field of B 2 is not energized, this d-c current circulates through the armature of B 2 and is dissipated as heat. This current also initiates a magnetic field opposing the running field of the motor B 3 and in so doing provides smooth, rapid magnetic braking when the sawyer decelerates the carriage. End travel switches are installed on the carriage driveway to ensure that the carriage will not overrun its tracks.

Example for Small Mill

This log carriage drive is a good example of a successful electric drive for small mills. Present cut averages 25,000 fbm per day of dimensions, U. I. standard, from 8 in. to 48 in. diameter (average 24 in.) logs, with 36 ft maximum lengths. Two 52-in. top and bottom circular saws are used. The cut could be increased 30% by improving the feed to the carriage. A Selsyn log setter, which will be described in a future data sheet, is responsible in part for the increased cut.

The log carriage installation without the setter costs approximately $6,500. Electrical consumption of the log carriage drive is estimated at 6 kwh per 1,000 fbm.

The mill operator is well pleased with the d-c variable speed drive, considering that it has fast effortless control, is inexpensive to operate and is reliable.

ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

Good or bad

Far Western contractor members of NECA look with mixed feelings at the national advertising campaign that is part of the public relations program sponsored by the association. Many see no tangible direct benefits, although admitting that such promotion should produce results. Some question the approach of the advertising copy. One chapter manager who uses reprints of advertisements for a direct-mail campaign to local prospective industrial and commercial customers says that to date he has had only "two or three" requests for copies of the chapter membership list. Announcement that the program would be financed by advertising revenues from QC brought forth the comment that this was a subterfuge to allay criticism of those who object to increase in dues to pay for the program.

Sets a precedent

IBEW union members in the San Francisco Bay area are contributing 10c each toward financing the adequate wiring television program that is being aired weekly over San Francisco Station KPIX. It is believed that this sets some sort of precedent for union cooperation. The program will cost $12,000 and will extend well into 1954. Plans are underway to telecast the spot announcements over Fresno's new station.

Outlook bright

Outlook for new construction for 1954 is good according to the annual forecast by the U. S. Labor and Commerce Departments. The $34 billion total is only 2% below 1953's record-breaking volume. Roughly 20% of the total represents potential West Coast volume. Of particular interest to electrical contractors are these 1954 figures: private residential, $11,225 million, down 4%; nonresidential, $5,575 million, down 2%; electric light and power utility, $1,250 million, up 2%; public nonresidential including schools, hospitals, etc., $4,275 million, down 1%; military and naval, $1,200 million, down 12%. Somewhere between one third and one-half of the totals represent backlogs—work now in progress or under contract that will carry over into next year.

Gadget prize

Gadget-minded motor shop folks are being solicited for ideas for the 10th annual prize award contest of the National Industrial Service Assn. Fourteen prizes in all with cash awards totaling $350 will be distributed for shop ideas, tools or gadgets, simple or otherwise, of benefit to everyone in the motor shop industry. Last year's winner was a "C" frame to be suspended from the hook of a hoist to facilitate loading heavy motors into automobiles and panel trucks. Contest closes March 15.

No AW

Decay of urban housing is a No. 1 U. S. problem according to findings at a round-table meeting conducted by the National Association of Home Builders, the National Association of Real Estate Boards and the Mortgage Bankers Assn. A preliminary report in the form of a "Rehabilitation Textbook" is featured in House & Home magazine's current issue. Experts estimate that there is a $570 billion renovation job on 30,000,000 urban homes. Lack of adequate wiring is one of the shortcomings of this outmoded housing.

Lamp Life

Benefits of group relamping can be shown visually on a new lamp burnout visualizer produced by General Electric's Lamp Division. It's a slide-rule-type device that shows the number of burnouts to be expected at various stages of average lamp life. Among the results visualized is the fact that it will take 33 hours of a maintenance man's time to replace 100 burnouts one at a time and that group relamping can cut labor cost 60% to 85%.

Head man

H. Cedric Roberts, Los Angeles building contractor, will chairman the California Contractors' State License Board for the period ending June 30, 1954. Edgar L. Buttner, Oakland electrical contractor, is a member of the board's public relations and grievances, rules and regulations and legislative committees.

Rules change

Licensees who have obtained California contractor's licenses through the qualifications of a "responsible managing employee" or officer will be affected by a new rule of the Contractors' State License Board. Under the new rule such a responsible managing employee or officer "would be placed in the position of exercising authority (a) to make technical and administrative decisions, and (b) to hire, superintend, promote, transfer, lay-off, discipline or discharge other employees, or to responsibly direct them or effectively recommend such action, when his principal has work in progress; and who is available for consultation in technical and administrative phases of his principal's business when there is no work in progress."

No. 1 fire

Electrical causes such as improper maintenance, wrong equipment in danger areas and improper installation are still the No. 1 reason for industrial fires. The National Board of Fire Underwriters latest report on fires lists the first three causes as electrical, 19%; friction, 14%; and foreign substances, 12%. Static electricity is far down the list and accounts for only 2% of all fires.

Prize winner

San Francisco's Broadway Tunnel lighting installation won first prize in the 1953 IES national contest on the subject "My Most Interesting Lighting Job" (described in EWest, May 1953, p 88). Sunbeam Lighting Co. equipment did the job, which was installed by George F. Brayer Co., electrical contractors.

Hot ceilings

Radiant heating cable in measured lengths of a specially constructed and insulated type that is waterproof and noncorrosive has been developed by Electromode Corp. for ceiling installation. Special feature is a seal that eliminates any possibility of streaks in the plaster.

Lamp ballasts

Ballasts for so-called "quick start" fluorescent lamps must now meet material and performance standards set up in a temporary or proposed specification developed by the Technical Committee of the Certified Ballast Manufacturers. It will carry the temporary designation until the required period of trial and criticism demanded by the American Standards Assn. has passed and ASA formally approves it.

More selling

Sylvania's cooperative contractor promotion program continues to win plaudits from those who are using it to stimulate lighting business from stores, offices, factories, schools and theaters. One Washington contractor reports a 15% increase in lighting installations over last year; a California contractor says the program brought in $6,500 in new business.

Lock switch

Standard and weatherproof rotary-type lock swtiches featuring Corbin locks have been reinstated in the Arrow-Hart & Hageman Electric line of wiring devices. They are designed for installations where it is necessary to prevent unauthorized use of lights.

Automatic factory

Project Tinkertoy, sponsored by the National Bureau of Standards to develop automatization techniques in producing electronic circuits, has been made the subject of a motion picture film. Automatic factories with machines that literally control themselves electrically and electronically are the newest thing on the industrial horizon.

Heat pumps

Heat pumps, the hottest (and coldest) item in the rapidly developing air conditioning boom, are competitive from an operating cost standpoint, in the Intermountain Region. The 5-hp heat pump installed in the Salt Lake City home of W. A. Huckins (EWest, November 1953, p 89) cost $203.24 to operate through one winter and one summer. This is about the cost of other fuels sold in the area for winter heating alone. Monthly charges for winter heating ranged from $30 to $37 and summer conditioning cost $1.04 to $3.76 monthly.

Can't compete

For engaging in business in competition with private industry, an electrician employed by the city of Sacramento, Calif., was suspended from his job for 15 days. He was operating the Sacramento State & Theatrical and the Sacramento Stage & Scenery Companies in violation of the city charter, which provides that municipal employees shall not engage in outside activities in competition with private business. He also had been storing his equipment in the municipal auditorium.

J. H. Pengilly, president, Paul Johnson, moderator, L. A. Hicks, host, and C. W. Leihy, speaker, as 9,000 vanta orchids made an atomic burst background for the PCEA Hawaii conference which considered electrical industry subjects ranging all the way from . . .

Orchids to Atoms in Hawaiian Economy

Orchids and atoms—an odd combination anywhere but in Hawaii. But significant both of the lush gardens that the Islands are and in the thought expressed several times in the PCEA conference there, Nov. 19-20, that Honolulu might be a most appropriate location for an atomic electric power generating plant. Indeed the floral decorative background for the speakers at the fourth annual Hawaiian Conference of Pacific Coast Electrical Assn. was an atomic explosion of some 9,000 baby orchids from which electricity emerged symbolically.

Three of the featured speakers talked atoms and power. L. A. Hicks, president of Hawaiian Electric Co., in welcoming the 300 people attending from the Islands and mainland, declared, "It is significant that electrical men want to harness this new source of power, atomic energy, to the uses of peace and industry." In back of what he said was an unexpressed wish implied that Hawaii be given the opportunity. He cited the way in which men in the electrical industry have developed the fuel and water sources of power to high efficiencies and produced phenomenal results to the benefit of the public.

Francis K. McCune, general manager of the Atomic Products Division, General Electric Co., Schenectady, presented one of the clearest over-all pictures in words alone of "Atomic Energy in Industry" that has been heard. He covered what atomic energy is, touched on the weapons of the government, told of Congressional acts for security, related the progress made under the AEC program. In doing so he indicated the time had come when "we must find a way to have more participation in the atomic energy program, to channel more of American business knowledge and ingenuity in this work. It is not easy to do and keep security."

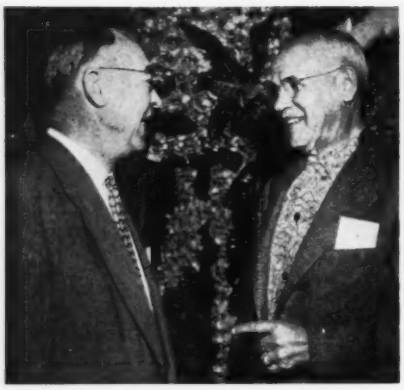
Congress must decide whether secrecy will produce security or whether greater security will come from faster progress through the aid of private initiative. For one, he said, he believed in the latter. He felt that the law should be changed to permit power companies to own the materials and facilities to convert atomic energy into electric power.

He gave four reasons for not waiting until the costs of conventional fuels make atomic energy a necessity: (1) To develop such power is a goal of national importance in international competition; (2) industrial competition in the world justifies speedier development; (3) technology is now at a point at which the economic feasibility can be foreseen; (4) rapid developments in the past year, a remarkable rate, will be increased and bring use of atomic energy by central stations much closer.

He then added, "I submit that Hawaii is a very appropriate place for such a central station."

Walter J. Maytham, Pacific Coast district manager, Westinghouse Electric Corp., San Francisco, also touched on atomic power in the course of a talk on "Research in Industry." As one of many types of research mentioned he spoke of Westinghouse's work on zirconium as part of its development of an atomic power plant for submarines and he took pride in the selection of his company by the AEC to build the first full-scale plant to develop electric power, at least 60,000 kw.

Maytham previously had shown how whole industries and companies had come from research. "It is the one thing that has made our country what it is today. It has changed the face of the earth." In his talk he spoke highly of the work done by the Hawaiian sugar planters association and the



Spalding Pengilly

Sharpe Field

DeBard Black

pineapple companies, not only in producing and protecting these valuable crops but in developing by-products from them. And he did some "blue sky gazing" into some of the still unknowns, such as solar power, still challenging man.

Plenty of Business Too

But it was not all orchids or atoms, by a long way. In fact most of the program was based on the practical realities of the electrical business in all of its branches in the light of today's conditions. Paul A. Johnson, manager, machinery and electrical department of American Factors Ltd., moderated the well-prepared and balanced program of Harry P. Field with precision. Both the general program on Thursday and the parallel sessions of Business Development, Engineering and Operations, and Administrative Services Sections were keyed to Island interest and inspiration.

The dry humor of PCEA President Joe H. Pengilly, Pacific Coast manager of Square D Co., Los Angeles, slipped into his address on the value and activities of PCEA. He answered common questions as to what the PCEA was and whether it was a utility organization by reviewing its history and telling of its wide memberships and activities.

"If we develop our industry the results might amaze us. Consider the plumber. Starting with an outdoor facility, he sold the idea of placing it indoors at great expense. He named it a bathroom. He then beautified it with chrome fittings, artistic and colorful tile and porcelain. He proceeded to sell two, three or even more in a single house while we were still apologizing for recommending a couple of extra switches to enable one to walk through a room in light instead of darkness.

"What are we doing to develop our industry? What can we as individuals do? It is clear that my company could hardly hope to induce a man to build a house so that we could sell him a load center. It would not have been easy to sell a generator to Mr. Hicks unless the load were increasing enough to require it.

"Some might say the seller of consumer goods is the one to do the creative job. But he can hardly sell ranges unless electric power is available and unless the houses are adequately wired . . . All parts of the industry are pretty dependent on each other."

Appliances came in for treatment by two major speakers.

With only 50% more prospects, as population trends show, but with 100% more capacity to produce appliances even on a single-shift basis, the real job, said C. W. Leihy, publisher of *Electric Light & Power*, Chicago, is to sell this capacity against the competition of other industries. He called the wave of consolidations in the appliance business a horizontal integration for spreading the base for tax and diversification. It means more money and brains will be poured into sales and promotion. Perhaps dealer franchise control similar to that in the automobile business will come too. There are not too many dealers, he said, but not enough of them who know how to work a franchise.

An optimistic look into the future was given by John C. Sharpe, Hotpoint's president from Chicago, who spoke for his compatriots, the appliance manufacturers. He admitted the business was not without problems. He told of manufacturers' increased labor costs, difficulties in maintaining uniform production schedules. Organized labor's demand for an annual wage will bring more pressure on dealers to sell to keep factories running. Discount selling and price cutting are educating the public to shopping around. Since 1940 the number of appliance makers has tripled, of distributors has doubled, of dealers increased only half. This creates pressure on dealers to carry multiple lines. Yet if a dealer learns the full story on one line he is doing a lot. Young college men are avoiding salesmanship as a profession.

Yet despite these problems, Sharpe said people talk themselves into troubles. With the faith that had built the industry the future can be built too. Business is the great difference between our free country and communistic states. And business is built on salesmanship that develops demands for the productivity of the people.

Private companies will be in a better position to fight for free enterprise if they can point to active and good commission regulation. The alternative is state ownership and control. On this basis those who are regulated and those who do the regulating should meet on common ground, said Jesse H. Kopp, a member of the public utility commission of the Territory of Hawaii. He is also vice-president and manager of Nanakuli Limestone and Gravel Co. He mentioned the danger in regulatory commissions of overspecialization with experts, saying that a commission should have experts on tap but not on top. The lot of the regulators has been no bed of roses lately. Rising costs have brought a flood of requests for rate increases. The question of what is a proper rate base is not easily answered and uniformity among states is not possible because of value clauses in some state laws. Recognition must be given to the competitive capital situation, too, he said.

What socialism has done to the electrical industry in Great Britain was told in documented detail by Davis M. DeBard, vice-president, Stone & Webster, New York. He showed how two entirely different systems of government prevailed in Britain and the U. S. In America utilities were permitted to extend their lines and to consolidate. In England this was not

McCune

permitted. This led to many voltages and frequencies which could only be standardized later by complete government control. While there was some private enterprise in electricity there was promotional work; now there is none. Lack of capacity causes "load shedding" instead each winter. New plant location and building are subject to so many commissions that delays are endless. Neither employees nor unions are happy with the regimentation they are under.

Fischer Black, editor of *Electrical World*, New York, ended the first day's sessions with a summary of business conditions and changes in the nation. He gave a realistic picture of the slight declines in housing, industrial production and family formations. But he showed that balancing influences are potential tax reductions, high personal income, high employment, savings and others. Electric output continues high. He also listed a number of other strong factors in the economy.

Business Development Aplenty

It was an impressive report of success and cooperation that George A. Rinker, W. A. Ramsay Co., presented to open the Business Development Section meeting Friday, over which he presided in the absence of N. A. Surbaugh, Sears Roebuck & Co., who recently was transferred to Los Angeles. Rinker's report was of the year's activities of the Electrical Living Committee of which he is chairman. The electric dryer program, January to March, had resulted in 146 demonstrations and 135 sales to old homes. Hawaiian Electric had helped with wiring expense. In April to June the electric range and water heater program, where the utility again offered a wiring allowance ($50 for range and $25 water heater and distributor and dealer made up any extra), 2,615 units were sold and installed—1,348 ranges, 1,267 water heaters. There were 18 distributors and 148 dealers participating. The freezer promotion from July to September, offering a food package of from $30 to $50, tied in with Honolulu *Star-Bulletin* freezer schools at which demonstrations were made by the home service department of Hawaiian Electric and attended by 4,600. It resulted in the sale of 922 units.

The current electric housewares campaign, with PCEA car cards bearing the slogan "Electrical Housewares —Gifts that keep on giving" resulted from a contest among the industry. Dealers and distributors promote easy terms, lay-away plans and gift wrapping. Next year's schedule was also announced — laundry equipment for January-February, ranges and water heaters March and April, dishwasher, disposer and calcinator in May and June, room air conditioners in July and August, food freezers in September and October, and electric housewares and television in November and December. And Rinker urged the other Island utilities to capitalize on the promotions in each month by conducting similar cooperative activities.

That the 30-gal water heater is inadequate for homes with automatic washers and dishwashers and that NEMA standards relative to controls and element ratings need to be reconsidered was the contention of David M. Moncrief Jr., assistant commercial manager, Hawaiian Electric. The water heater satisfactory to customers, he maintains, is the one that gives customer service and satisfaction. Hence the Island standard, he said, should be a 30- or 40-gal heater with two 2-kw units operated uncontrolled on a 24-hour basis without interlocking between the two elements. This gives a recovery rate of 20 gal per hour compared to the NEMA standards' 8 gal. Distributors are cooperating wholeheartedly in this program.

A coffee break that turned into a Kilowatt Karnival was staged during the morning session. It was modeled from similar carnivals that the home service department of Hawaiian Electric, under Mrs. Erma Meeks Boyen, had staged last year for homemaking class teachers and homemakers and which will again be staged as a Christmas Carnival. At two rows of gaily decorated booths the home service girls demonstrated housewares by serving tasty samples which they made on the spot in roasters, deep fryers, blenders, mixers, coffee makers, toasters, waffle irons, griddles, etc.

Leonard Hobbs, vice-president of Smoot-Holman Co., Inglewood, and regional vice-president of Illuminating Engineering Society, said that not until nine out of ten salesmen know the quality of their product and sell it will the public be able to obtain the benefits of quality products. He prefaced his plea for sound and intelligent selling by showing what had happened to the home lighting business because cheaper and cheaper materials were put into products to reduce price, disregarding lighting quality. Now houses are built without living room fixtures at all and $10 buys all the fixtures in a $10,000 house. Hobbs, knowing from real experience as a manufacturer, told of the value of the standards and testing represented by the ASA, IES, NEMA, RLM and UL. He told how fluorescent fixtures are more complicated and need skilled design and research to have them deliver the light where and how the customer needs it.

Of strong local interest was the summary of the television broadcasting situation in Hawaii up to the present time made by C. Richard Evans, vice-president and manager of KGMB-TV. A new 10,000-kw transmitter is being adjusted now to begin broadcasting and should reach some of the difficult areas across the high Hawaiian peaks.

Terence O'Rouark, chairman of the farm electrification committee and commercial engineer for Hawaiian Electric, had an exhibit of many electrical farm devices in a little grass shack near the lanai in which the meetings were held at Queens Surf. He said there were 14,000 acres of diversified farm and 1,500,000 in range land; 3,500 farms in all, 2,000 of them outside of Oahu and they had produced $36,000,000 in crops last year, about half enough to supply the Island needs. Over 90% are electrified and the use per farm averages 3,000 kwh, about the same as the domestic average. He advocated more personal contact, more publicity, more sales activity by farm equipment dealers, 4-H programs for farm children and cooperation with farm agents in order to develop more farm load.

Administrating Small Utilities

Small utilities have the same problems that large ones do—in relative scale. But because they are small, instead of having experts in many phases, the personnel often have to be jacks of all trades. This was well brought out in the symposium on the "Special Problems of Small Utilities in Hawaii" on Friday afternoon, in the Administrative Services Section meeting. R. R. Lyons, vice-president and manager of Maui Electric Co., was moderator.

The need for an adequate yet simple form of agreement to hold ease-

Administrative Services Section (left)—R. R. Lyons, Maui Electric Co., chairman; William MacKenzie, Hilo Electric Light Co. (seated); George Will, Molokai Electric Co. Ltd.; Lloyd Osborne, Kona Light & Power Co. Ltd.; Colin Murdock, Maui Electric Co. Ltd. (standing). Business Development Section (right)—C. Richard Evans, KGMB-TV; William Armstrong, Hawaiian Lighting & Supply, chairman; Leonard A. Hobbs, Smoot-Holman Co.; David M. Moncrief Jr., Hawaiian Electric

ments for rights-of-way arose when a woman, legally well-supplied, bought some land and insisted on pole removal. The experience, said Lloyd Osborne, manager, Kona Light & Power Co. on Hawaii, caused a search for a better form than a gentleman's agreement. After studying many other forms a simple one of four paragraphs was developed that seems to meet the requirements, he said, describing it.

George Will, manager of Molokai Electric Co. Ltd., proved that the personal cultivation of friendship and confidence bears fruit among low-income customers. With only 1,200 customers kwh sales have grown from 2,661,000 kwh in 1948 to nearly 8,000,000 this year and average annual consumption per customer from 2,108 in 1948 to 3,214 in 1952. But every employee is a salesman in addition to his other jobs.

Personnel problems of a small utility were discussed by Collin Murdock, assistant treasurer of Maui Electric. A bigger utility, it has more employees, but the fitting of these to take over the work of others to carry through sickness and vacations has been given attention. He urged closer coordination among Island utilities in labor negotiations and similar policy matters.

How the overgrown and overloaded, antiquated accounting system at Hilo Electric Co. was being overhauled and simplified was told by its experienced CPA general manager, William MacKenzie. But he had to get air maps of the area made, name streets that had none, assign house numbers (all of which he gave as a package to the territorial government) in order to set up meter routes based on one full day's meter reading each, to cover the area with two meter readers where 11 were needed before. A simple Cardex system replaced books for multiple entries. Bimonthly billing was instituted and still more clerks eliminated. Service order procedure is also being streamlined and other accounting functions will be as soon as possible.

Questions from the floor about LP gas competition revealed little in Molokai and Hilo, but on Maui a stronger beachhead was obtained when electric capacity was inadequate.

Lyons ended the session with a plea for more consideration for the forgotten stockholder. "Are we thinking enough about him? Is he getting a fair return for his savings? After all, he provides the money that makes the company possible that also makes our jobs. We should all do more to bring the stockholder into the picture."

Agricultural exhibit with T. O'Rouark, chairman of the Farm Electrification committee, in foreground. The Kilowatt Karnival booth is shown on the cover of this issue

Engineers Talk Brush Control

"New Engineering Developments" were brought to the Engineering and Operations Section meeting by O. A. Gustafson, manager-engineering, Pacific district, Apparatus Sales Division, General Electric Co., San Francisco. Lewis W. Lengnick, vice-president, Hawaiian Electric Co., was chairman of this section. Gustafson gave a com-

Engineering and Operating Section—Robert M. Martin, Pacific Chemical & Fertilizer Co.; John C. Ripperton, University of Hawaii; Fred C. Denison, Hawaiian Sugar Planters Assn.; Alan Thistle, Board of Commissioners, Board of Agriculture & Forestry; J. P. Michels, Hawaiian Electric Co. Ltd., moderator, chemical brush control panel

Insulator washer demonstrated for section

prehensive picture of the uses and the potentialities of extending automatic electrical and electronic equipment into the processes of all industries. He described the several kinds of electronic analyzers and their applications. And he ended with a description of what productive maintenance could mean in making plant operation smoother and more efficient.

William B. Farinon, supervisor, electronics engineering, Mutual Telephone Co., Honolulu, described the extent to which mobile radio telephone service is now used by utilities and large companies and industrialized farms to keep in communication with personnel in the field. He gave costs and outlined reception considerations, illustrating with profiles the field strength of signals at various places beyond mountain obstructions.

Brush is a real problem in the lush islands where vegetation grows like nothing known on the mainland. Hence the panel discussion of "Chemical Brush Control" that ended the session went overtime because of the interest it aroused. J. P. Michels, manager, distribution department, Hawaiian Electric, who moderated the panel, told of the formation of the Hawaii Weed Conference to study and experiment. Several members of it were on his panel.

Alan Thistle, appointed by the legislature on the board of commissioners of Agriculture and Forestry, spoke only of the law and the Territory's role of seeing that herbicides did not harm forests or agriculture. John C. Ripperton, agronomist, Hawaii Agricultural Experiment Station, University of Hawaii, gave figures comparing costs of hand cutting as against spraying in four areas with 2-4-D and 2-4-5T. Costs had been from $5 to $25 per acre.

Robert Martin, agricultural technologist, Pacific Chemical & Fertilizer Co., described the action of the hormone herbicides and then described a new product, CMU, on the market a year, a wettable powder applied to the ground that sinks to the roots and is a general herbicide, effective for a year or longer, safe to use near animals and humans. He showed pictures of use along a jungle railroad right-of-way. Reaching the roots, however, it affects trees some distance away whose roots extend under the area treated. Fred Dennison, Island representative for Oahu of Hawaiian Sugar Planters Assn., recited experience of its use in cane fields.

Any attempt to describe the hospitality and warmth of entertainment and attention given so overflowingly by the host, Hawaiian Electric Co., and by all of the electrical industry in all of the Islands must fall far short of adequacy. Met at plane or boat with flowers, treated to cocktail parties, luaus (native barbecues), a dinner dance, coffee breaks at midsession, a Kilowatt Karnival of edible treats, the members and guests were royally treated.

Credit for the excellent program and logical arrangement was due Harry P. Field, general conference chairman. For the cocktail party by manufacturers and distributors, Chairman Alfred E. Linczer. Mrs. Ralph Johnson headed a gracious committee for ladies' entertainment. Charles E. Nolan kept the conference well publicized. E. A. Helbush registered the 373 men and women. Hardest worker was Harry J. Palmer, stage manager, for not only the orchid-atom explosion but every detail of place and props was his. President Leslie Hicks of Hawaiian Electric, PCEA vice-president for the Islands, was ever the gracious host to all.—Aloha.

Northwest Group To Meet in Boise

Boise, Idaho, will be the scene of the 1954 sales conference of the Business Development Section of the Northwest Electric Light & Power Assn., May 10 to 12. Headquarters will be at the Hotel Boise, according to D. J. McGonigle, Montana Power Co., section chairman.

Over-all plans for the conference were made at a planning meeting of the section's executive committee in Portland, Nov. 16. Earl A. Olson, Idaho Power Co., was named general chairman of arrangements.

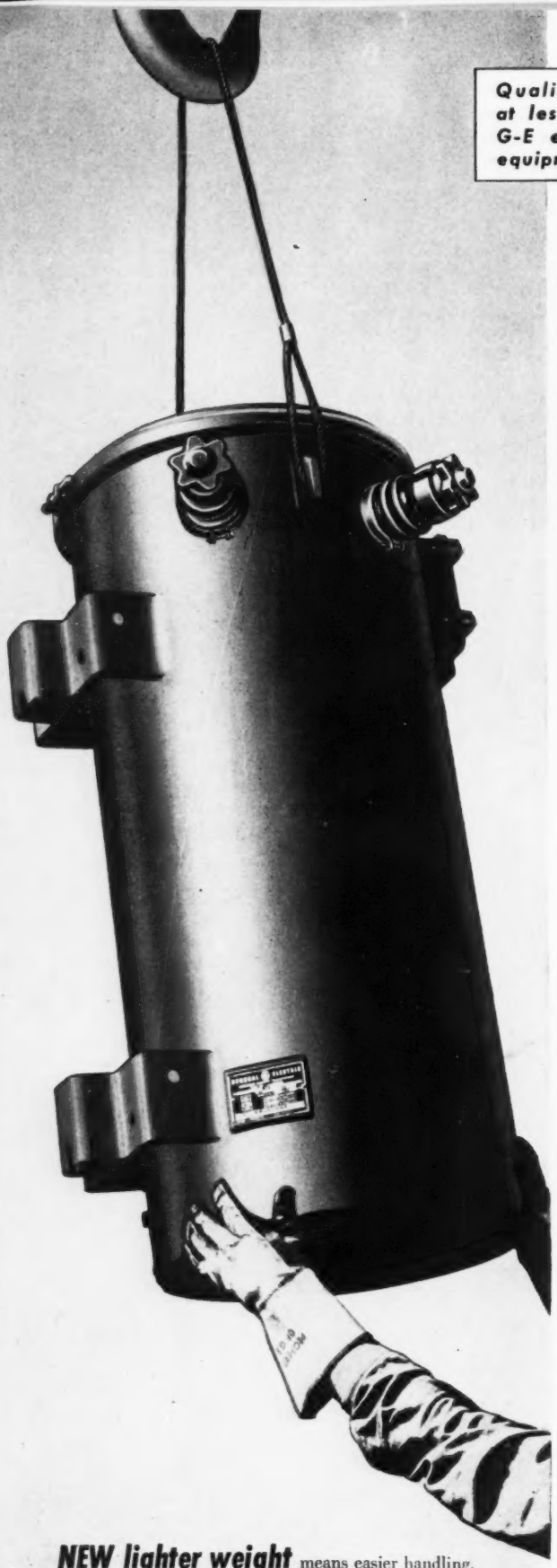
Two half-day sessions of bureau meetings will be sandwiched between three half-day general sessions to complete the two and one-half days of intensive program. The chairman of the bureaus, who will conduct their own sessions are: Commercial and Industrial, Blair Plowman, Washington Water Power Co., Spokane; Electric Home Bureau, Leonard Regan, Montana Power Co., Great Falls; Rural and Farm, C. A. Root, Pacific Power & Light Co., Portland.

A banquet with entertainment and a wind-up luncheon session will be features of the meeting, and Idaho Power Co. expects to show the delegates some of the new company properties that have figured in the extensive postwar expansion program of the company.

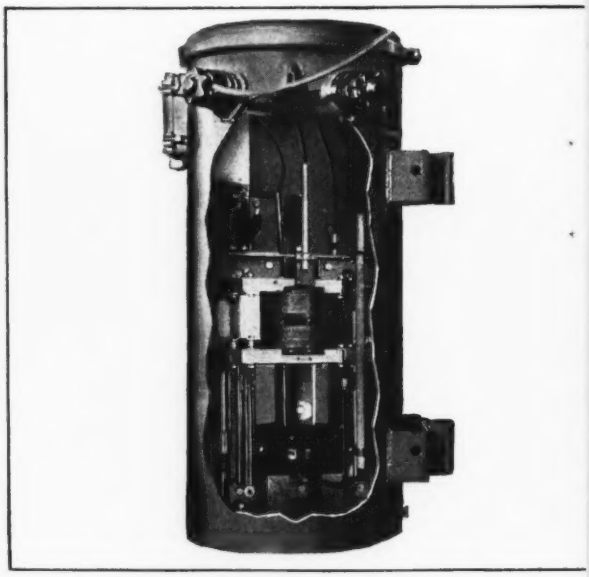
Quality lighting at less cost with G-E engineered equipment.

ALL NEW G-E Constant-current TRANSFORMER for Street-lighting Systems

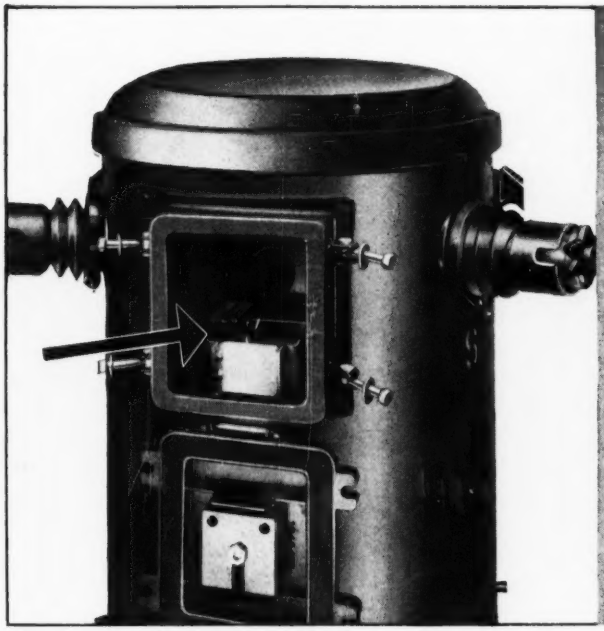
up to 33% lighter



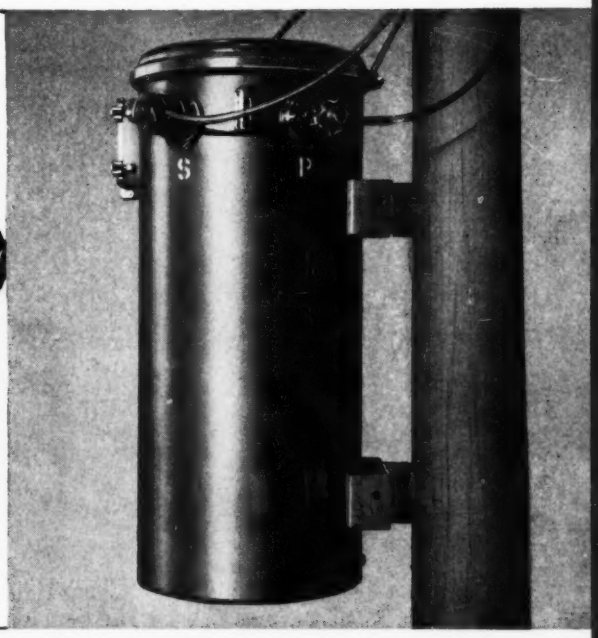
NEW lighter weight means easier handling. RO2 transformer, including oil, is 20% and 33% lighter in the 10-kw and 30-kw sizes respectively.



NEW faster response to load changes from radically new design which eliminates counter balance, introduces parallel straight-line motion, cuts down friction points.

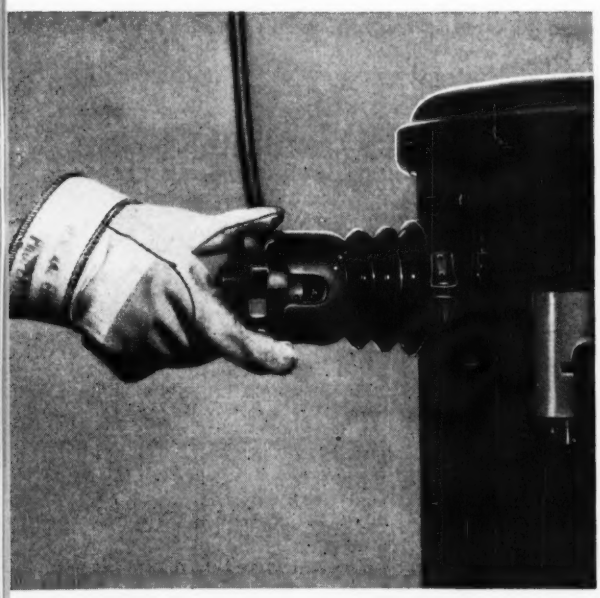


NEW easy adjustment is accomplished from the outside through convenient access door located above the oil level. Transformer cover need not be removed.



NEW easy mounting cuts installation time. Special slotted mounting bracket allows direct-pole mounting of models up to and including the 20-kw size.

. . and far easier to install and maintain



NEW simplified connections, quickly, without tools, by inserting the cable from either direction into the bushings and tightening the insulated handwheel.

G.E.'s new CC transformer for street lighting represents the most sweeping design advance in the industry in 50 years.

LESS FRICTION—It uses the magnetic suspension principle to completely support its moving coil. Thus, the only points of friction in the entire assembly are the two sleeve ball bearings which direct vertical movement of the moving coil.

LIGHTER WEIGHT—The new CC transformer is lighter and more compact, permitting pole mounting of larger ratings than was possible before. Grain oriented silicon strip steel in the core and aluminum wire in the moving coil conserve space and weight.

GREATER CONVENIENCE—Easy installation and servicing are assured by the simple mounting bracket, the cable bushings with their insulated handwheels. The access door on the side of the tank permits adjustments without removing the cover and reaching below the oil level.

VERSATILE—Designed to supply constant current for series street-lighting circuits, this new G-E CC transformer will operate efficiently with any type of lamp load.

MORE INFORMATION—Is available from your nearest G-E Apparatus Sales Office or authorized G-E street-lighting agent. Or write for Bulletin GEA-5975, Section 452-137, General Electric Company, Schenectady 5, N. Y.

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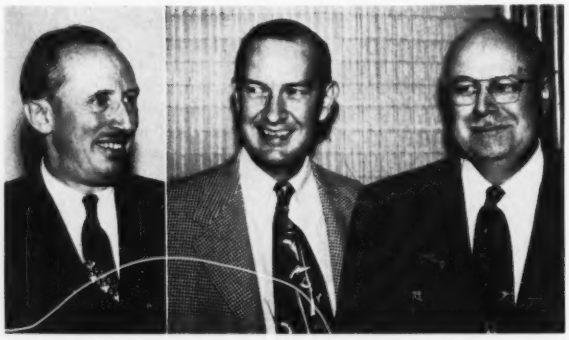

Stone Sargent Hall

Job Techniques Discussed by Joint Group

Working sessions carefully planned to give time both for reports and discussion insured full exchange of know-how between members of the Pacific Coast Electrical Assn.'s Administration Services Section and the Pacific Coast Gas Assn.'s Accounting Section attending the joint conference in Hollywood Nov. 12 and 13.

George Coughlan Jr. and John Brass Jr., both of Pacific Gas and Electric Co., are co-chairmen and J. T. McNab, Arizona Public Service Co., is vice-chairman of joint activities. Conference registration was 146, with four groups of the section represented. The other four will meet at the Claremont Hotel in Berkeley on April 7 and 8.

Challenges and responsibilities facing the industry today were brought out forcefully by luncheon speakers —Willis E. Stone, president of the American Progress Foundation, Los Angeles, and Henry B. Sargent, president of Arizona Public Service Co., Phoenix.

"You are the American story—you and your business," Stone declared and went on to predict that the trend of a whole way of life, now in the balance, was going to be close to the way things go in the electric industry. Citing Hells Canyon as an example, he said that the question is not which form of power development there is of most benefit to the people, it is whether or not the Constitution is dead. "We are going to have to fight for free enterprise," he declared, having earlier warned against the false assumption that, no matter how we abuse the American way, it will endure "to protect us from our folly."

Nothing in the Constitution says the government has a right to dictate about gas and electricity, he stated. "If we can't establish that, free enterprise is a gone goose." Eighty-eight federal corporations, all operating without the slightest pretense of constitutional authority, consumed in 1950 more than $19 billion tax dollars for socialism without the consent of the governed, he declared. Adding that today in the United States 40% of the land area and 20% of the industrial capacity is federally owned and operated, he called upon citizens who believe in the Constitution and are willing to stand up and be counted to get the facts before the people.

For tools, they can go back to the faith of our fathers and to the Constitution, he declared. He pointed to the proposed 23rd amendment before Congress providing that the United States shall not engage in any business, professional, commercial, financial or industrial enterprise except as specified in the Constitution. This, he said, gives force and effect to words already there.

The industry must answer a challenge, Henry Sargent declared. That challenge was laid down by Interior Secretary McKay, when he said we must start with conditions as they are today and, if we find unfortunate trends, we must establish new ones that will lead in the right direction.

Reviewing conditions as they are today, Sargent pointed out that the federal government is very much in the power business and still has a lot of special privileges that make it difficult for private industry to meet the challenge.

Among new trends, the most important, according to Sargent, is the over-all philosophy to take power away from the federal government and restore it to the states. Also important are the attempts toward balancing the budget and a more wholesome attitude on the part of the various agencies.

McKay's power policy had to coincide with laws on the books, he pointed out, and the preference clause was there. "It is incumbent on us to establish new trends if we are not satisfied," he declared.

To help establish those new trends, he said, the industry needs: (1) a sound philosophy, including a willingness to finance big projects and organized support for sound regulation, for a sound money program, removal of unfair discrimination in marketing and a research program; (2) efficient operation, which would look toward creating a better product at less cost and would include an aggressive sales program, cost-conscious operating program and a sound cash program; (3) to inform the public and along with this better support for the industry's several information programs; (4) faith in our government, in its individual citizens and in the industry.

"Our success depends on spiritual qualities of faith and responsibility," he concluded.

Clerical Manpower Standards

Carl Weiss, So. Calif. Gas Co.
Sponsor

Four audio-visual talks were supplemented by exhibits, which included numerous posters, graphs and illustrations, picturing the development of manpower formulas for branch offices and various work sections.

Job Analysis and Time Study—H. A. Rogers, So. Calif. Gas, outlined a method giving: (1) An over-all perspective of the office organization; (2) a means of organizing new jobs as to grade level requirements, departmental alignments, etc.; (3) assurance that clerks are assigned work within

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their various grade levels; (4) information as to the percentage of work performed by each clerk within his grade level as related to the percentage of work performed below his grade level; (5) a better means of determining the percentage of time to be charged to the various work sections; (6) a means of establishing manpower guide formula.

He pointed out that since it is common practice for all companies to use job descriptions in some form this medium can be used as a base to arrive at these objectives, by use of what he termed a spread sheet.

On the spread sheet are shown all of the operations derived from the job descriptions. Operations are listed in numerical sequence and subdivided by job levels. The time spent monthly on each operation by each clerk is recorded. Time spent on the various working sections can be accumulated also by the use of a color code.

Further use of the data can be secured by having each office send the total hours accumulated for each operation to the central staff. The central staff, paying attention to monthly and bimonthly billing, can convert this information to a common factor and prepare a summary, by districts, in terms of hours per month per 1,000 accounts for comparison purposes.

In conclusion, Rogers pointed out that the statistics derived from this spread sheet method supplemented with time study results can be developed into a manpower guide formula to help in analyzing additional manpower requirements for districts subject to heavy growth and to set up personnel requirements for newly created districts.

Application to District Offices—A. L. Barker, Coast Counties G&E, discussed the use of district office manpower standards to solve many problems involving work measurement in commercial offices. These standards have proved useful in obtaining maximum benefit from procedural changes. He pointed out that the original standards must be revised when procedures are changed within the district offices. The manpower standards are applied to all of the offices periodically, to determine the current manpower situation in each. Also, they are applied to individual offices when it is felt that increased work load warrants the addition of clerical manpower. Additional positions have been authorized only in those instances where the standards have indicated they were warranted.

He further stated that whenever a procedural change is being considered the anticipated manpower savings should be determined. To do this, the current standards are used to find the manpower requirements for the existing procedure; time studies are then made of the proposed procedure and the monthly manpower requirement obtained. The difference between the two manpower requirements will indicate the saving to be expected. After installation of the new procedure the new monthly manpower requirements must be determined and the actual manpower saving obtained.

The standards have been very helpful also in forecasting future manpower requirements in district offices. Estimated manpower needs can be determined by adjusting the units of work to reflect anticipated customer growth.

Meter Reading—D. E. Shively, So. Counties Gas, presented the results of application and use by his company of meter reading standards that were obtained from another utility. Before the standards could be applied, it was necessary to establish the string system of indexing.

The string system of indexing proves beneficial not only to meter reading but also other operations such as order dispatching and sales promotion.

In applying time study and measurement to meter reading it was necessary to analyze all accounts, both in the office and in the field. Attention was paid to such items as number of locations, number of extra meters, method of walking the street, walking distances along the street, walking in and out of premises, grades, reading classifications and special field conditions.

After completion of the field work, the existing formula was applied to the various parcels of work. These were added together until they were sufficient to make up a day's work.

Responsibility for maintenance of the string indexing and the time adjustment of meter books because of growth is centered in one man in each division. These men were trained by the staff at the time the measurement program was installed. Small divisions usually depend on a staff man to drop in periodically for a few days to keep the program up to date. The maximum time spent to maintain the program in any division is only 50% of a man's time. The scheduling of meter books to be read in an area is usually staggered throughout the month to adjust the work load in branch offices. The result of this program has been a 2% to 15% gain in the productivity for meter reading.

Analysis by Test—W. M. Fisher, So. Calif. Gas, illustrated by means of a flannelboard presentation that the results from the application of time study measurement alone were not conclusive. To do this he used an actual case study of a clerk whose work unit hour production indicated very unsatisfactory performance. The reaction of his supervisor after working with him and being unable to raise production was to release him. This recommendation was turned down on grounds that the information was not sufficient and as a result a recommended testing procedure was developed.

Under this procedure the supervisor must make a thorough analysis of a clerk's work in all job operations performed. Fisher emphasized that the fault may not lie with the clerk but with the supervisor. Questionnaires filled out during this analysis can be passed along to other supervisors in the chain of responsibilities so that they may assist in reaching a sound conclusion.

Customers Accounting Section

Jack R. Leman, So. Counties Gas
Sponsor

Unit Desk Accounting—It was brought out in discussion led by Earl T. Crick, Coast Counties G&E, that several companies have divided customers' accounts into groups and assigned each group's job operations to a desk. Each desk is a separate accounting unit covering all the functions for a given number of accounts and at each desk are maintained the accounts receivable ledgers, meter books and all related records required for posting cash, preparing daily cash reports, posting orders to meter books and preparing closing bills.

Discussion brought out: (1) number of accounts that may be handled on a unit desk varies, depending on

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for voltages 69 to 154 KV*

LIST OF MATERIAL

Quantity	Description
2	Crossarm
3	Steel spacer fitting w/mounting bolts
2	Stud bolt ⅞" w/2 washer nuts
4	MF locknut ⅞"
2	Static wire support
4	Machine bolt ⅝" w/locknut
2	Clevis
2	Suspension clamp for static wire
as req'd	Suspension insulator and fitting

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turn on and turn off frequency, number of new applications and the telephone traffic of the particular area; (2) assignment of accounts to a particular unit is on a geographical basis; (3) training of personnel should be done on a function basis and each function should be taught separately until the clerk is familiar with the operation as a whole; (4) greatest advantage of a unit desk is that all ledgers and records are conveniently located so that the clerk does not have to run around looking for them.

Branch Office Customer Accounting—Place of the branch office was discussed under leadership of C. T. Dickson, Arizona Public Service. It was found that most companies represented maintain centralized customer accounting operations within districts or divisions; use outlying branch offices primarily for receiving payments and orders. Some companies, however, because of geographical expanse, do all customer accounting in the individual branch offices.

Turnover in personnel was found to be one of the greatest branch office problems. General practice is to hire local people and train them on the job before the terminating employee leaves.

Level of supervision of branch office employees varies with the number of employees in the office. In some instances one person supervises a number of branch offices, in others there is more than one supervisor in a single office. Geography and meter density are controlling factors, it was brought out. Method of supplying relief varies from maintaining a central pool in the division office to having supervisors act as relief clerks.

Collections—John E. Fox, So. Calif. Edison, cited basic considerations for determining a reasonable collection policy: (1) effective collection of the revenue billed; (2) maintenance of reasonable net write-offs; (3) promotion and maintenance of good customer relations; (4) fair extension of credit; (5) sound but reasonable collection follow-up.

Discussion showed that most companies are experiencing higher write-offs and that methods, procedures and policies are being investigated to determine what can be done to control this trend.

The Third P in the Pod—Vic C. Pack, So. Calif. Gas, referred to a paper presented a few years ago in which the author said good customer relations depend upon three Ps—Policy, Procedure and Personnel—which when properly coordinated make a package that spells customer satisfaction.

Pack pointed out that the effective personnel, the Third P, can be developed and maintained by: (1) effective selection of public contact employees; (2) proper indoctrination of new employees; (3) thorough training of public contact employees; (4) effective training follow-up; (5) keeping employees informed. He told about a formal program now in use for selection, training and maintenance of effective customer-contact employees.

Preparing Customer Contact Employees for Discussion of Rate Increases—James D. MacFarland, So. Counties Gas, discussed procedures used during a recent rate increase to maintain good public relations. Methods were drawn up to explain and interpret to the public, employees and stockholders the company's policies, plans and, where necessary, actions to eliminate suspicion, doubt and distrust.

Walter Prill, So. Counties Gas, presented a typical employee meeting, including the showing of a film, *The Legend of Dan and Gus*, which points out the difference between most businesses and a regulated public utility.

Frank C. Sullivan, public relations consultant, pointed out that only since about 1947 has there been a seriously pressing customer relations problem from rate increases. Since then principles for meeting this problem have had to be evolved, he said. One of the most important of these is that employees must understand the company's position. This may be explained at meetings, movies, in pamphlets and by any other media that will allow the employee to answer questions and discuss rate problems intelligently.

Mechanized Accounting Potential

John L. Liecty, Arizona Public Service Co. Sponsor

Customer Accounting — A discussion of addressing equipment brought out the fact that some companies using the stub billing system have added a sequence numbering device that can be secured at nominal cost. Automatic placing of a consecutive bill sequence number on the face of all parts of the bill and office record simplifies and speeds stub sorting and cash posting, it was explained. Sequence numbering should have: (1) two letters denoting the month; (2) billing district or control number up to four digits; (3) individual bill serial number.

Primarily for use in the rate department, the bill distribution record can also be used to advantage by the sales department for studying customer use by areas, it was reported in discussing subsidiary records. Preparation cost would be more than offset by gains if it were used to the fullest by the sales department when planning promotional programs, it was added.

A subsidiary record that can be secured as a by-product of the customer billing operation is the individual "large" or "special" account history record. This record should show the customer's name, address, account number, rate, monthly use, kw demand and amount of bill. It is valuable when making rate studies and can be used also by the commercial and industrial sales department for obtaining actual bill data when necessary, it was pointed out.

Discussing methods of simplifying and reducing maintenance costs of meter history records, some members of the group reported that their organizations have developed a meter coding system that designates the number, type, size, phase, wires, etc., for single-phase watt-hour meters. These code numbers are embossed on the customer's address stencil and, at the time new meter tickets are addressed, will be printed automatically.

Advantages and economies of codifying meters are to: (1) simplify clerical work in taking customer orders and in maintaining facility records; (2) assure higher degree of accuracy when posting records with meter information; (3) simplify and assist in preparing shut-off notices, since controlling meter data would appear on the office ledger portion of the bill; (4) make possible the ultimate abandonment of the meter history record on the majority of meters.

General Accounting—New developments in use of mechanized accounting equipment were discussed. At least one company represented plans to prepare its monthly operating and financial reports as a by-product when closing the books each month. The machine used by this company, when posting the final monthly book figures, prints the figures on a preprinted duplicating master report form and the desired number of copies can then be run on a duplicating machine.

Pros and cons of "penniless accounting" were discussed and consensus was that considerable time could be saved by it.

Plant Accounting—It was shown that various types of mechanized equipment are in use. Most companies represented use a work order estimate, which is prepared by their engineering department and serves as a control to insure that each job is correctly charged. In cases where the actual is over or under the estimate by more than an established percentage, the plant accounting department ask for a revised estimate and an explanation of the error.

Employee Problems Connected with Mechanized Accounting—Generally it was believed that this prob-

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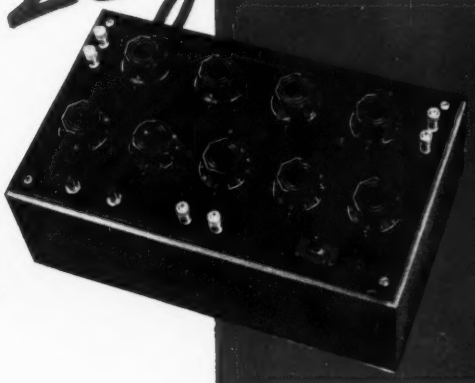

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Behind statements like these stand Driver-Harris production and drawing techniques, which provide Manganin of such fixed stability that maximum change in resistance between 15°C and 35°C is only about 15 parts per million per degree centigrade—and frequently *less than one-third this* amount. Equally good electrical characteristics are available for ammeter shunt stock operating between 40°C and 60°C.

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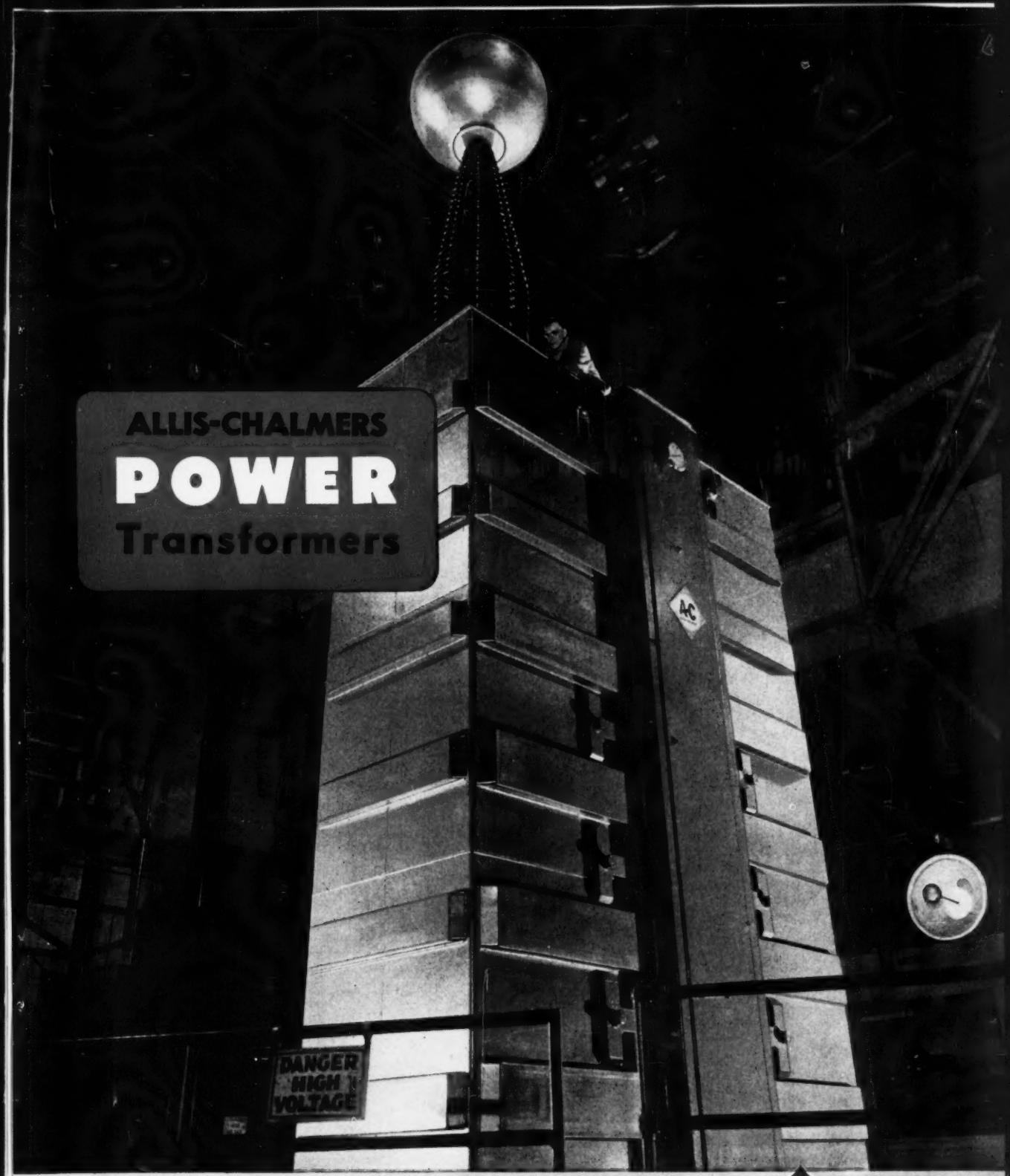

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lem is more of a "scare" than a reality. In most instances it was reported that normal growth has absorbed any excess personnel and that drastic layoffs have not followed installation of mechanized equipment.

Electronic Accounting Equipment—It is evident, the group believes, that electronic accounting is here to stay and development of the machine is progressing rapidly. Programming of the work is of paramount importance, it was brought out, and training of personnel cannot be accomplished in a few months but probably will require one or two years.

W. W. Hall, chief methods consultant of Ebasco Services, New York, reviewed material presented at the Electronics Seminar held at the EEI-AGA conference in New York last October. He told of new equipment and projects.

When electronic accounting equipment is available in quantity, the ultimate goal will be to effect lower cost per unit of work handled, the group believes.

Right-of-Way and Land

R. E. Davis, So. Calif. Edison
Sponsor

Survival of Public Utilities Under Modern City Planning—This discussion stemmed from rapid land development on the Pacific Coast, which has brought more restrictive zoning ordinances and new problems to public utilities.

It was brought out by Norman G. Kuch, So. Calif. Edison, that detailed planning and educational programming could result in drafting of standard phraseologies that might well be incorporated in all local ordinances. This might include proposed adoption by planning commissions of a standardized design of building, setback, fencing and landscaping. It was indicated that, by compatible working relationships with various planning commissions, an automatic zone variance could be developed, making elaborate applications and public hearings unnecessary.

The panel discussion following this paper indicated that public utilities must recognize this increasingly important problem and solve it if they are to preserve their rate structures.

Freeways as They Affect Public Utilities—Kenneth J. Diercks, PG and E, gave the meaning and characteristics of freeways as defined by the State of California. He told the reasons for augmenting the Collier Burns Act by addition of Sections 700 through 707, which became law in September 1947 and which pertain only to utility facilities situated within the right-of-way of public roads. It was pointed out that under these sections publicly owned utilities receive 100% reimbursement and privately owned utilities the same, except that the private company must prove that its franchise contains no express contractural obligation to relocate at its own expense. As a result of controversies between state and utility attorneys a compromise agreement apportioning costs and obligations of each party was drafted and added as Section 707.5 in 1951.

The nature and extent of freeway activities have put additional burdens upon the utility in preparing estimates and billing and it is believed that further legislation is needed to place freeway cost more justly on the freeway user rather than the utility rate payer or the general public.

Legal Problems in Relocating Utility Facilities for Public Works—This presentation by Frederick W. Mielke Jr., PG and E, stressed the importance of proper handling of proposed locations from the very beginning of negotiations. Nonlawyers and lawyers alike should be on guard to distinguish eminent domain from attempted use of police powers by public bodies, it was brought out.

A concise distinction was given as to police power, eminent domain and proprietary capacity of public entities and it was pointed out that a consistent and united stand should be taken on police power matters and proprietary capacity vs governmental capacity. If the companies keep their reasoning straight and take a sound and equitable position on these matters, they may help prevent erroneous viewpoints from becoming prevalent among public officials, it was suggested.

Rights-of-Way—Public Relations Specialists, Inside and Outside—O. E. Owen Jr., San Diego G&E, forcefully brought out the fact that nothing in right-of-way and land procedure remains static with the exception of "need" and "successful negotiations" and further that successful negotiations depend very largely upon the existence of good public relations. Top managements of many progressive companies have undertaken well-planned educations programs to instruct various departments in the responsibility of each and the interdependency of all in public relations. It was indicated that with one organization it has become the practice to compensate, in some manner other than financial, property owners who have donated distribution or transmission rights-of-way at nominal cost. This action is controlled by the division's executive officer and takes into account that the rate base is designed upon donated distribution rights-of-way.

Land Description and Measurement as Applied to Acquisition of Right-of-Way; Easement Preparation and Negotiation—Thomas R. Brooks, So. Calif. Edison, particularly emphasized importance of proper and intelligent description of real property and of the easement strip to be recorded as encumbrances upon the title. Need for precision of statement, accuracy of references and use of phraseology that presents no conflict between engineering and legal interpretations were declared essential to continued success in the right-of-way profession.

The group discussed advantages of a right-of-way agent who is sufficiently trained to search title, prepare an accurate sketch and write a legal description to be used in a conveyance without the benefit of title company services and independent of his home office.

Several in the group told views of their companies in disposition of easements secured, most of them agreeing that recordation of the instrument is of prime importance.

Joint Facilities—Dana L. Clancy, So. Calif. Edison, gave a resume of the Southern Joint Pole contract from its inception in 1906 to the present and indicated that it operates today much as it did at the outset. It was concluded in the discussion following his talk that closer cooperation is needed between utilities occupying joint poles and that preparation of joint easements is merited. It was the consensus that in preparing joint easement mutual agreement on equitable cost sharing is necessary.

Subdivisions—A general resume of this problem from 1950 to 1953, during which approximately 1,500 subdivisions were recorded in Los Angeles County, was given by George D. Sweeney, So. Calif. Edison. It led to the conclusion that changes should be made in the Business and Profession Code as it refers to the Subdivision Map Act to allow for specific provisions for utility easements. It was pointed out that proper wording incorporated in the Certificate and Acknowledgment on the final map would effect a reservation of easements delineated on it. Upon recordation of the map a simultaneous recording of easement grants to the utilities serving the subdivision would allow for full and complete easement rights to build and maintain utilities required.

It was brought out in the discussion following Sweeney's paper that the vehicle had been provided by a Senate Interim Committee on Subdivision Development and Planning. It was agreed that a committee should study suggested changes in the utility field for presentation to the Interim Committee Advisory Board.

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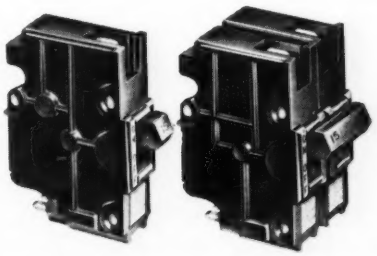

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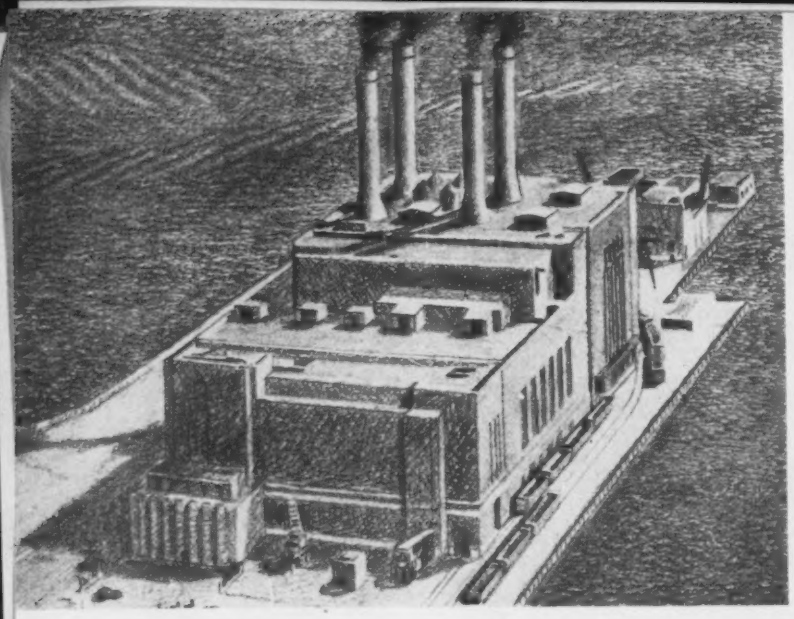

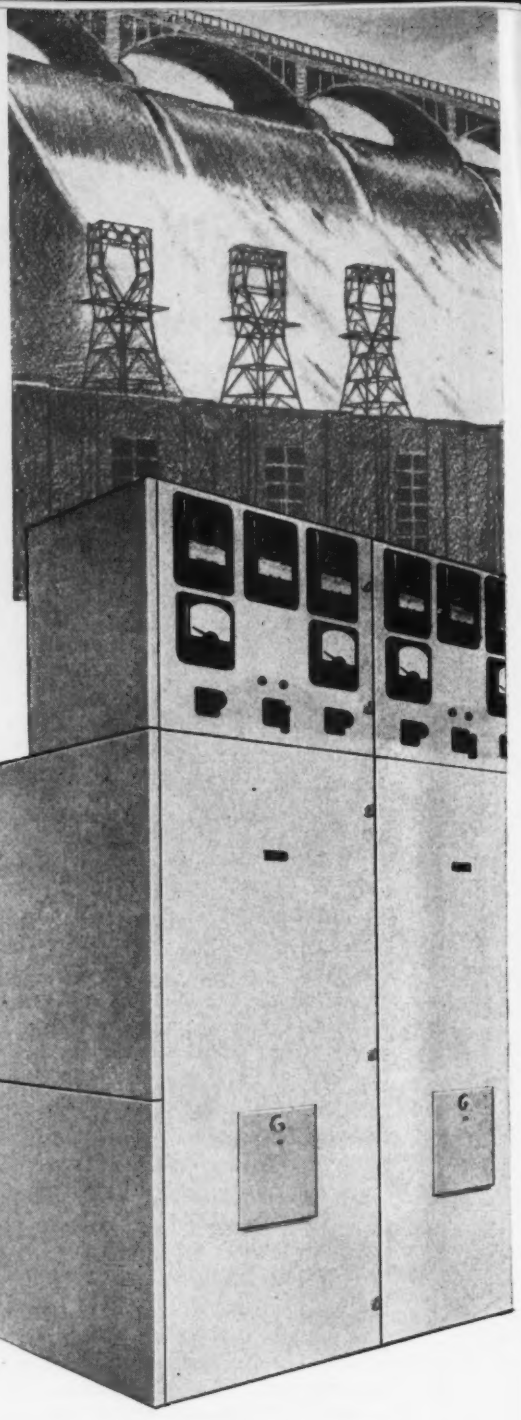

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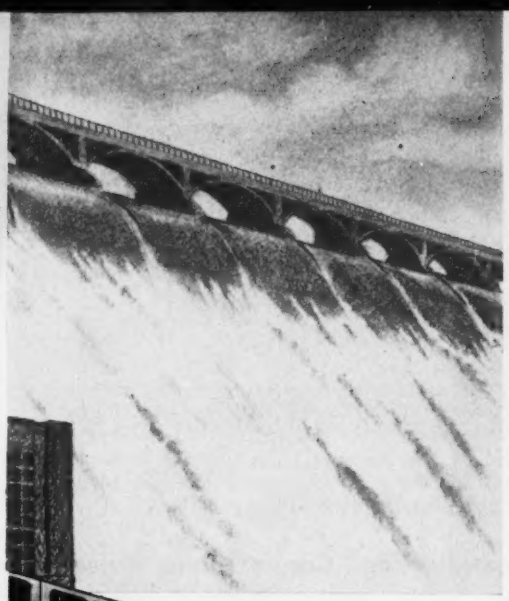

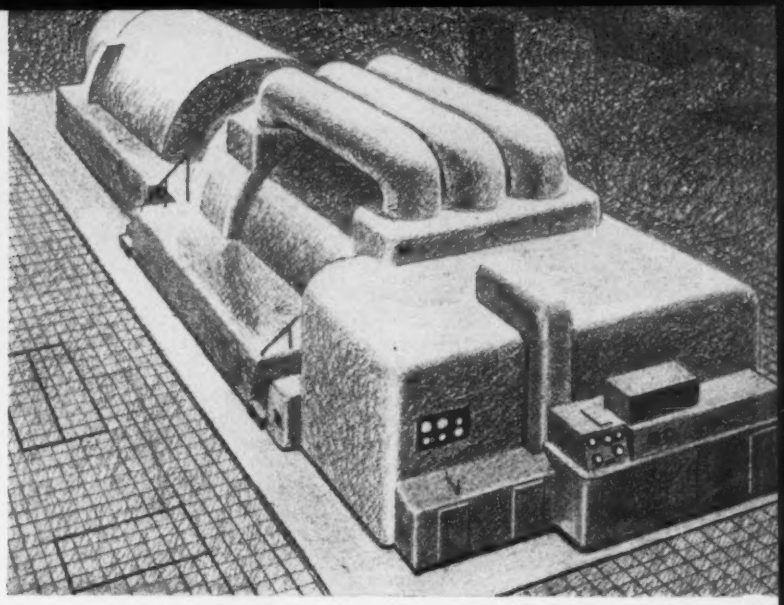

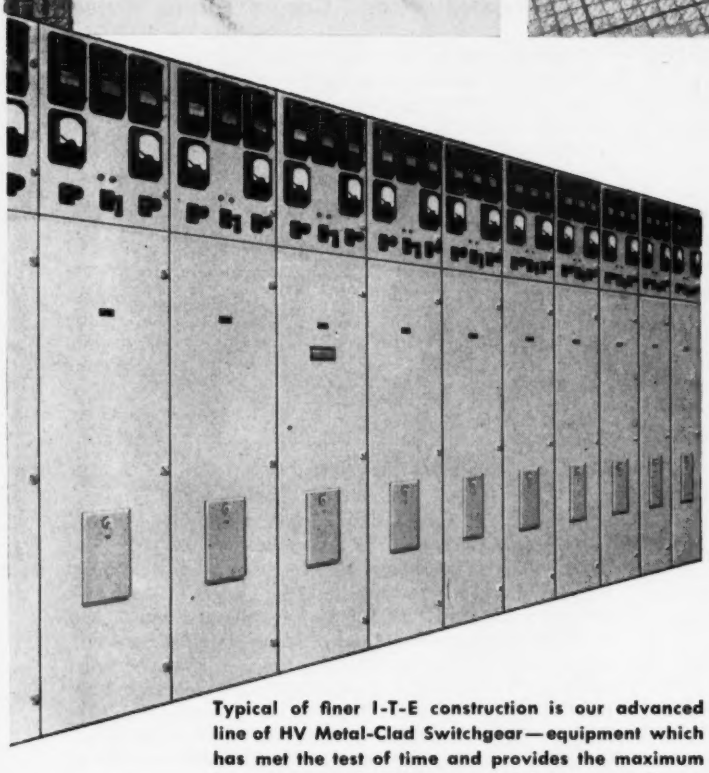

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THE MONTH IN BRIEF

Puget Action Is Protested

Puget Sound Power & Light Co.'s decision to continue operation as a private entity, announced in a surprise move Nov. 12 (see p 122), brought protests from Washington Water Power Co., PUDs, a stockholder group; was applauded by Governor Langlie and the Chamber of Commerce. Pointing out that the merger had state PUC approval and that reasons given by Puget for abandoning it were heard by the commission and found to be without foundation, WWP directors called Puget's change of mind inconsistent with numerous statements over the past several years that it was practically impossible for it to continue as a private concern. "This sudden action by Puget denies to its stockholders the opportunity to vote on this important matter," the WWP statement continued. "It is apparent that any further action must be taken by Puget stockholders themselves for their own protection." Meanwhile a committee of Puget stockholders announced from New York that it would continue to press for a merger. The PUD group declared that "if Puget closes the door on joint or local future negotiations, then about the only course open is piecemeal condemnation." Earlier in the month FPC announced that it had postponed its scheduled hearing on the merger at request of the PUDs and indicated that it would not set a new date until it was assured that the Nov. 19 deadline on the merger would be extended.

Interior Drops Appeal

Interior last month dropped its appeal against development by Pacific Gas and Electric Co. of the North Fork of the Kings River in California. FPC issued a license to PG and E about four years ago but Oscar L. Chapman, then Interior Secretary, directed an appeal on grounds that the Bureau of Reclamation wanted to develop the river's power potential as an added unit of the Central Valley Project. A hearing had been scheduled for Nov. 16 before the U. S. Ninth Circuit Court of Appeals in San Francisco.

City Light Post Vacant

Superintendent E. R. Hoffman of Seattle City Light has handed in his resignation after 14 years for health reasons. Speculators on his successor named as possibilities Paul J. Raver, Bonneville administrator; John D. Davis, assistant administrator of BPA; Frank Ward, superintendent of Tacoma City Light; and John Nelson, assistant superintendent of Seattle City Light. Selection is by the mayor, with majority vote of the city council necessary for confirmation. Hoffman's resignation is effective Dec. 31.

Motions Denied on Hells Canyon

FPC has permitted the State of Washington to intervene in proceedings on Idaho Power Co.'s application for its Snake River Canyon projects. The state is opposed to federal construction of a high dam at Hells Canyon; contends that "it would constitute a flagrant dissipation of federal monies that could more wisely be invested in projects known to have far greater flood control and hydroelectric power potential." FPC also denied motions filed by the National Hells Canyon Assn. requesting that Idaho Power be required to either revise its license applications or that FPC reject them.

Surcharges Justified, Commissioner Rules

Three Northwest power companies were justified in adding 20% surcharges to billings to pay for abnormal steam cost during last winter's hydro shortage, Oregon Utilities Commissioner Charles H. Heltzel ruled last month in dismissing complaints of Monroe Sweetland, state representative, and others. Heltzel said Sweetland failed to offer evidence supporting his charge that utility rates are excessive; declared that instead of being excessive they are now too low. He pointed out that Portland General Electric had cut rates $51,000,000 from 1939 through 1951 and that Pacific Power & Light and Mountain States Power companies also had made reductions. Oregon rates are 50% below 1939 and 50% below the national average, he stated. All witnesses unanimously agreed that the 4% rate of return advocated by Sweetland would amount to condemnation.

McKay Talks to Governors

Interior Secretary Douglas McKay told the Western Governors Conference at Albuquerque, N. M., last month that he considered development of power facilities secondary to reclamation. Called upon by Arizona's Governor Howard Pyle for a national water policy tied to the future population and needs of the growing West, McKay said that the need for such a policy becomes more pressing and that the time has come to review the water laws and to develop an over-all program. He stated that he feels the emphasis should be on expansion of the reclamation system. In the power field, he said, his thoughts are directed toward preservation of the multiple-purpose idea of resources development.

Pool Members Set Planning Meet

All members of the Northwest Power Pool were called to a meeting at Seattle on Dec. 7 to set in motion plans to keep power supply in the area ahead of demand. Speaking before the Western Governors Conference, which set the December date, Governor Len Jordan of Idaho pointed out that, in announcing its intention of seeking greater participation by state and local groups in power and related developments, the federal government "has tossed us the ball; it looks like it's up to us to run with it." Stating that up to now, nobody has been doing any planning for needed expansion, he declared, "We don't want to get caught up in any valley development authority."

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THIS MONTH'S NEWS

Puget Power Says It Will Stay in Business; Terminates Merger Negotiations, Purchase Agreement

Refusing to extend either its merger agreement with Washington Water Power Co. or its purchase agreement with a group of PUDs, Puget Sound Power & Light Co. announced Nov. 12 that it would continue to operate as a separate entity.

"In the light of present conditions, there exists no sound basis or justification for further extensions of the Washington Water Power merger and the PUD agreement, which presently have termination dates of Nov. 19 and 20, respectively," President Frank McLaughlin announced with the unanimous agreement of the company's directors. "Consequently Puget will remain in business."

McLaughlin cited three factors influencing the board's decision:

"1. Both the merger and purchase agreements are currently tied up in litigation and there is no likelihood of either being consummated in the foreseeable future.

"2. It is becoming increasingly clear that the people of western Washington are fed up with the ceaseless bickerings, legal snarls, turmoil and strife which have afflicted them 'powerwise' for some time.

"3. Puget became a party to the purchase and merger agreements in the light of the conditions then existing—mainly because it was indicated or represented that by such acts all stockholders who so desired might be afforded the opportunity of disposing of their stock so as to obtain around $27 per share cash by the consummation of either transaction within a reasonable period of time. Such has not proved to be the case and, because of current and threatened litigation, the merger and the purchase have stalemated each other absolutely.

". . . After weighing the various alternatives in view of the changed conditions, there has developed in Puget's service area what has all the earmarks of a popular demand that Puget neither merge nor sell its property—that it remain in business," continued the McLaughlin statement. McLaughlin claimed that "for the long pull, Puget's common stock is worth more than Washington's; is superior, the present stock market evaluation to the contrary notwithstanding . . .

"In view of its present exceptionally good equity position (60%), Puget has a large debt-issuance potential and based on evidence in the merger hearing could finance $30,000,000 (resultant debt ratio only 55%) or more of new construction with borrowed money at a net cost, after federal income taxes (current rate), of less than 2%. On the premise that the company is entitled to no less than an average return of around 6% on its net book cost of the property, annual earnings for the common stock could be substantially increased over a period of time as additional debt is created for new property (4% on $30,000,000 or larger amount)."

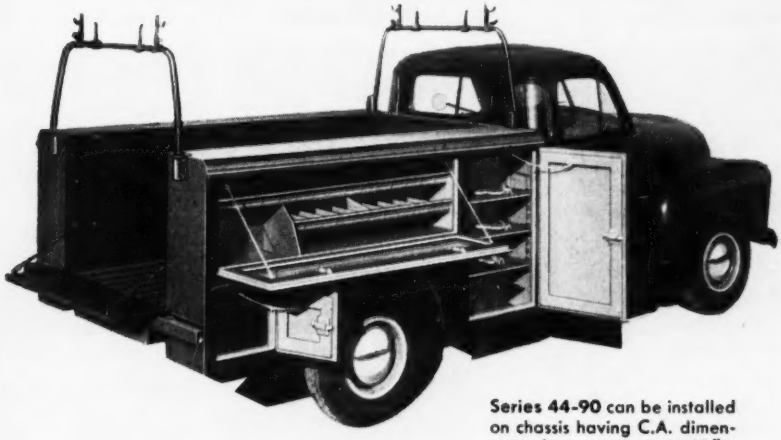
Stating that Puget's capital structure was approximately 40% debt, WWP's almost 70% debt, McLaughlin continued:

"Under the merger terms, on the basis of temporary financing by means of bank loans, good until April 30, 1954, the debt ratio of the merged company could vary from around 70% to 55%. No one knows what the capital structure of the merged company would be after April 30, 1954, when permanent financing must be accomplished. Evidence presented at the hearing before the Washington commission and allegations set forth in the intervenors' petitions show that the merger terms contain too many variables and uncertainties to be workable."

PUC Permission Required to Curtail Services

The Wyoming attorney general has ruled that public utilities can not discontinue or curtail services without authorization from the State Public Utilities Commission. The ruling came after the Burlington railroad advised the commission that it did not feel approval was necessary for abandoning or changing services at some of its agencies in Wyoming. The attorney general said that, while Wyoming law makes no specific reference to abandonment or discontinuance of services by public utilities, "it is inconceivable that the legislature intended to permit a discontinuance or abandonment without approval of the commission."

5 Ways to Speed Up Your Service Work



Series 44-90 can be installed on chassis having C.A. dimension of approximately 48″

Series 44-75 for chassis having approximately 40″ C.A. dimension.

Series 44-104 for single or dual rear wheel chassis having 60″ C.A. dimension.

Series 44-L-90 for chassis having approximately 48″ C.A. dimension.

Series 44-L-104 for 60″ C.A. chassis having single or dual rear wheels.

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- ☐ Series 44-L-90
- ☐ Series 44-L-104
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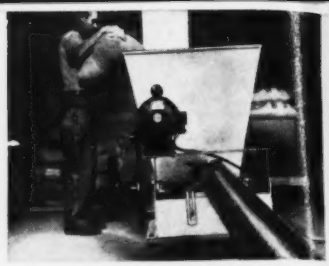
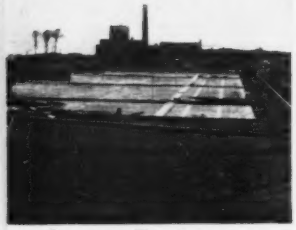
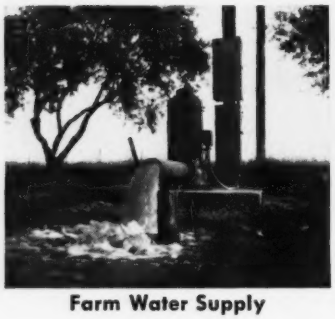


Electrified Farming

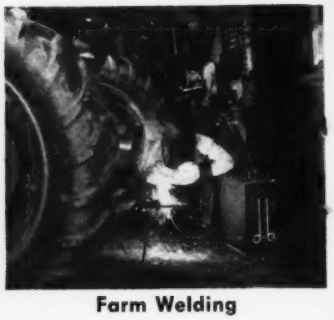


Sewage Treatment

Water Supply



Farm Water Supply



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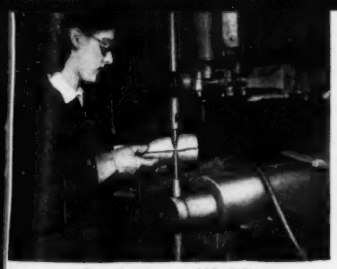
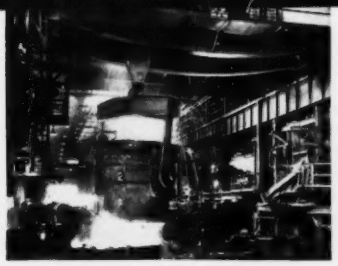
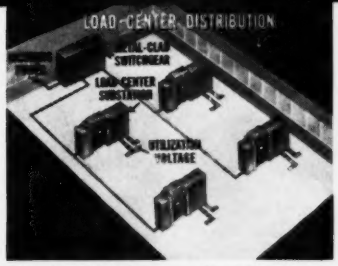
More Power to America



Resistance Welding



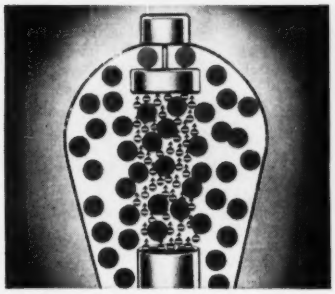
Materials Handling



Industrial Power Distribution

Laundry Electrification

Textiles



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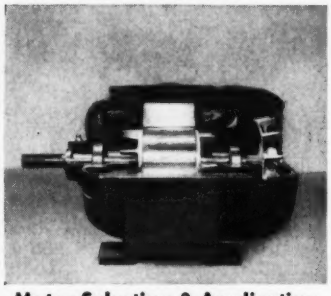
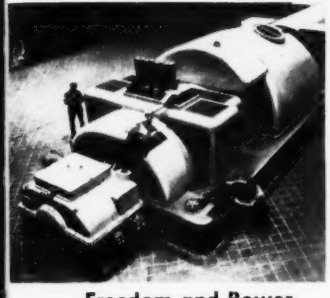


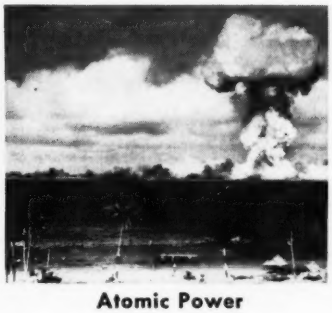
Motor Selection & Application

Oil Field Electrification

Industrial Heating



Freedom and Power



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☐ Water Supply (25-minute, 16-mm, sound-color motion picture) (GEA-4938-17)	☐ Materials Handling (24-minute, 16-mm, black-and-white sound motion picture) (GEA-4938-10A)
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☐ Farm Welding (25-minute, 16-mm, sound-color motion picture) (GEA-5074-2)	☐ Industrial Heating (30-minute, 35-mm, black-and-white sound slidefilm) (GEA-4938-14)
☐ Farm Water Supply (20-minute, 16-mm, sound-color motion picture) (GEA-5074-3)	☐ Motor Selection and Application (Ten 10–30-minute, 35-mm, black-and-white sound slidefilm) (GEA-4938-16A)
☐ Electrified Farming (20-minute, 16-mm, sound-color motion picture) (GEA-5074-5)	☐ Progressive Mechanization (27-minute, 16-mm, sound-color motion picture) (GEA-4938-18)
☐ Laundry Electrification (30-minute, 35-mm, black-and-white sound slidefilm) GEA-4938-1A)	☐ Freedom and Power (29-minute, 16-mm, sound-color motion picture) (GEA-4938-19)
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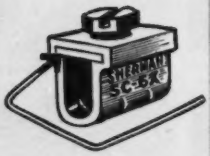

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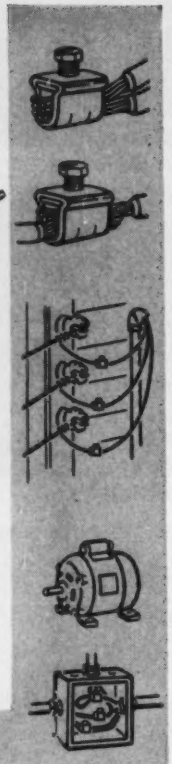

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INTERSTATE COMPACT IN COLUMBIA BASIN URGED

A resolution urging formation of an interstate compact commission among states of the Columbia River Basin was passed by the Pacific Northwest Trade Assn. at its 30th annual convention, held in Spokane Nov. 2 and 3.

The 300 delegates to the meeting approved the resolution despite the warning of former Oregon Governor Charles A. Sprague of Salem, who declared that no interstate compact "would bring an early solution to water resource problems of the Northwest."

Sprague maintained that "states are reluctant to be bound permanently to agreements on their water resources." He suggested that each state establish a final authority to judge water problems inside the state, and that a federal-state agency with legal powers be set up.

The convention heard Undersecretary of Interior Ralph Tudor restate the department's policy of developing reclamation primarily and power secondarily.

"I strongly believe that local interests not only want but should have a strong part to play in determining how their nation should be developed," Tudor said. "It would be wrong, and I don't think successful, for the federal government to take all the responsibility. The country is too big."

Tudor, at a press conference, said the Interior Department will not appeal the Federal Power Commission decision on Hells Canyon development, no matter what the decision may be. He pictured the FPC as the proper agency to make the final decision on Hells Canyon, and said that Interior is presenting factual information to help FPC decide.

He declared that, in his opinion and that of the Secretary, the "Bonneville Administration should be operated as a utility. It should buy the power at generation points, transmit it, and sell it at wholesale to the distributors." There are many agencies concerned with planning and policy for the Columbia Basin, Tudor added, and stated that he believes that "Bonneville should not engage in river planning or policy making."

• **A recent wind storm,** coupled with an accumulation of ice, damaged southeastern Wyoming rural electric lines more than any other storm in the last 13 years. REA Manager B. E. Lyons said that 40 to 50 poles were knocked out in the Borie-Buford section near Sherman Hill, west of Cheyenne. Ice broke many wires and it took several days to make repairs.

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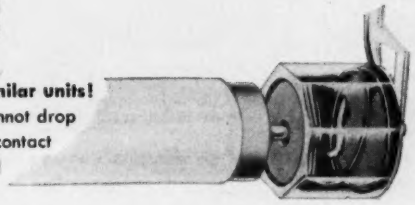

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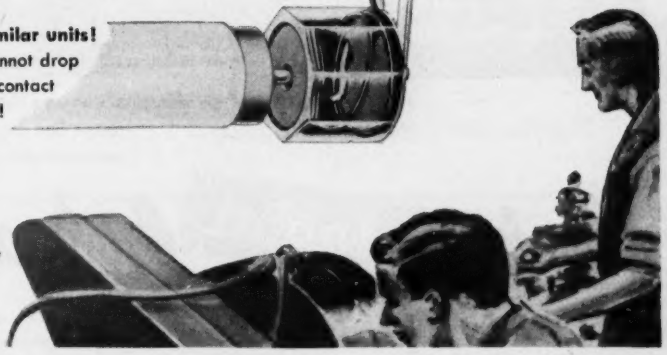

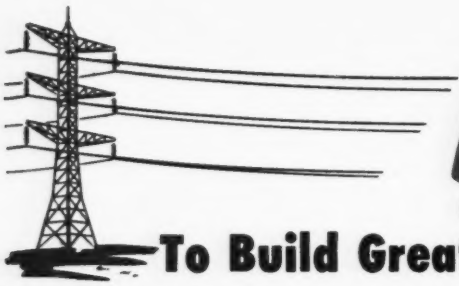

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The second of two articles on profits

What Are PROFITS Used For?

This is the second article on the role of profits in our economy. The first was addressed to the question: "How High are Profits?" The answer was found to be: not high when compared with previous years and the present investment in corporate facilities. This second article is addressed to the equally important question: "What do corporations do with their profits?"

In 1953 corporations will earn about $20 billion *after taxes*, if the recent rate of earnings is maintained throughout the year. These profits will be used (1) to expand and improve productive capacity through purchases of new plant and equipment, (2) to finance the operations involved in a growing volume of business and (3) to reward the people who have invested their money in American industry. Of the $20 billion, the corporations will pay about $9 billion to their stockholders as dividends. They will use the $11 billion that remains to purchase new plant and equipment and to increase their working capital.

This year corporations are increasing their plant, equipment and working capital by a total of approximately $32 billion. Of this amount, about $26 billion is for new plant and equipment. The remainder is for working capital. As this article will show in greater detail, about $21 billion of this will come from depreciation allowances and sales of new securities. The other $11 billion will come from retained profits.

It is impossible to trace exactly how each dollar of retained profits is spent. This money is mixed with other money that goes into the company treasury in the form of proceeds from loans, sale of securities and depreciation allowances. *However, it is a fact that by retaining $11 billion of their profits this year, corporations have provided $11 billion toward their total capital requirements, including the money needed for expanded and improved capital equipment.*

Profits Mean New Plants

This year American industry is engaged in a very large expansion of plant facilities. This will increase the industrial capacity of the nation by about 7 per cent. Since 1950, our capacity has been increased by about 12.5 per cent. And all of this expansion has been privately financed, even though about one-third of it was certified as necessary for national defense.

The expenditure during 1953 of $26

billion for new plant and equipment—an alltime record—imposes terrific financial responsibilities on our corporations. About one-half of the amount required will come from depreciation allowances. In general, these allowances are supposed to pay for the replacement of worn-out or obsolete equipment. Another $8 billion will be raised by corporations through new security issues and long-term mortgage loans. All together, depreciation allowances, security issues and long-term loans will provide about $21 billion. But this is still $5 billion short of the $26 billion needed for new plant and equipment this year. Thus, it is retained profits that spell the difference between expansion and standing still, between growth in the productive capacity of the economy and running downhill.

As plant facilities are expanded, corporations also need more working capital. A larger volume of business requires larger inventories, larger accounts receivable and larger amounts of ready cash to meet payrolls and bills for materials. The increase in these items during 1953 is estimated at $8.5 billion, of which about $2.5 billion will be supplied by short-term bank loans. The other $6 billion will come from retained profits. Thus, retained profits provide an essential $11 billion—$6 billion for working capital, $5 billion for new plant and equipment—to meet corporate financial requirements.

Incentive for Investment

The role of the profits that are paid to stockholders as dividends or to employees under profit-sharing plans is even more important than the role played by retained profits in providing plant, equipment and working capital. Dividend payments provide the main incentive for investment in the stocks of corporations. They are the reward for risks taken by investors. Dividends paid by corporations whose common stocks are listed on the New York Stock Exchange provide an average return of about 6.5% at present prices, and dividends on preferred stocks average about 4.5% return. Dividends are distributed among 6.5 million stockholders. Also, it is estimated that 3 million employees now are covered by profit-sharing plans. These plans increase the incentives of both production workers and managers to work harder and more efficiently.

Thus, more than 9 million Americans have a *direct* financial stake in corporate profits through ownership of stock or participation in profit-sharing plans. But *all* Americans share indirectly in the rewards of a successful business year. Investment of a major part of 1953 profits in new plants and equipment means more employment opportunities and better working conditions for labor. For the nation, it means new industrial capacity that is essential both for national defense and to produce more and better goods for a rising standard of living.

Corporate profits after taxes represent about 6% of the nation's total income. But the job they do to stimulate investment and to finance industrial expansion and improvement is more far-reaching and more essential to the prosperity and well-being of the American people than would be suggested by that small figure.

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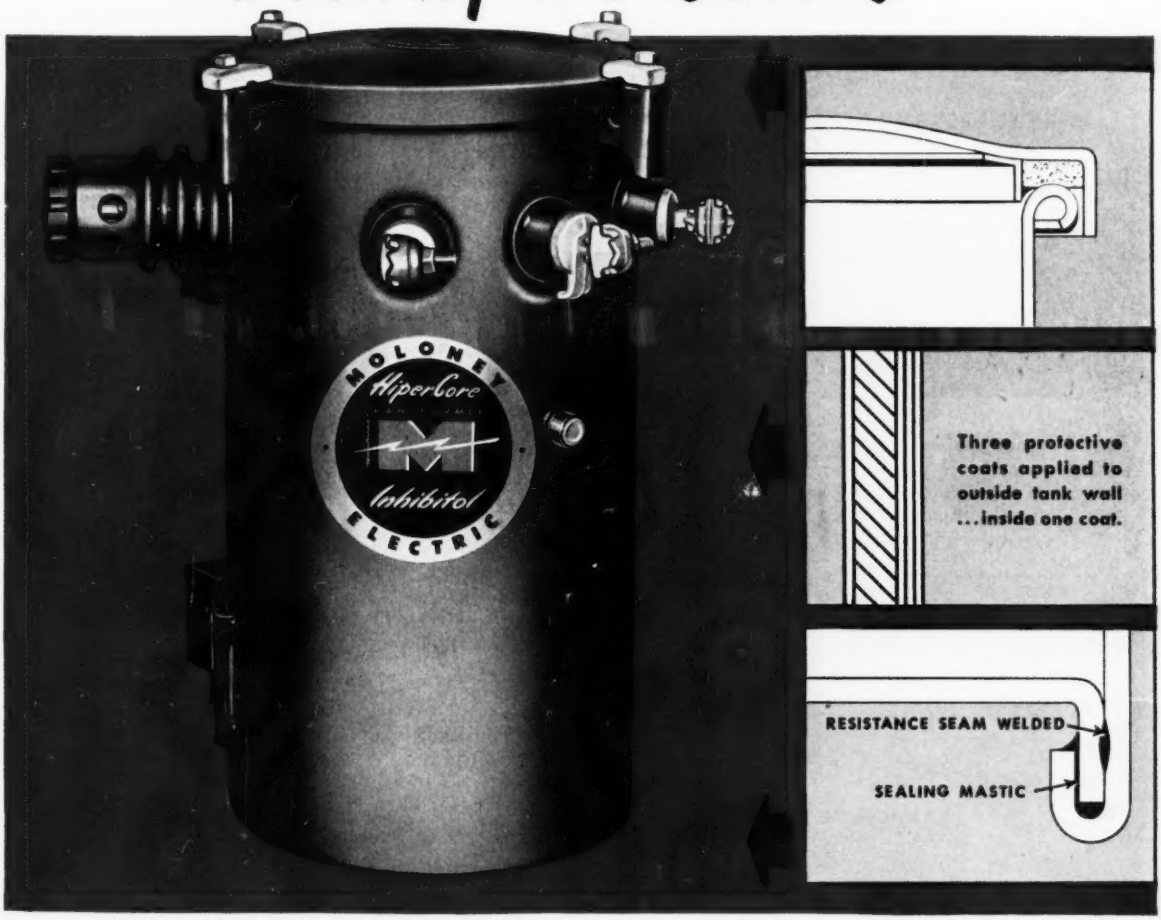

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Check the critical points of greatest wear and see how Moloney offers more. HiperCore Transformer tanks are pressure sealed to keep out moisture, and prevent the entrance of deteriorating agents harmful to the oil. Cover gaskets are retained and compressed for an absolute super-sure seal, and are reuseable. Bottoms are pressed in, seam-welded and rolled to a triple thickness to combine the reliability of a weld and the ruggedness of a roll. And, too, the tank receives protective coats of durable alkyd melamine paint, especially noted for its ability to withstand extreme weather conditions. This surface resists scuffing and scratching, provides longer life.

But, in transformers, it's what's inside the tank that counts most . . . and Moloney offers you HiperCore wound core construction which gives you a better transformer that is more compact, weighs less, lasts longer. Check these features against the field . . . and you'll find Moloney is better . . . all along the line.

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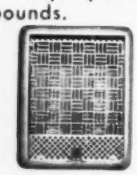

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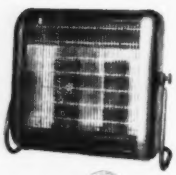

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NEW STUDY PLANNED ON TACOMA PROJECT

Proposed construction by Tacoma City Light of a $146,000,000 hydroelectric project will have to wait not only upon the courts but upon a restudy of the project by the city's new public utilities board.

The state's attorney general, after conferring with officials of the State Game Commission and State Department of Fisheries, announced he would appeal to the U. S. Supreme Court a recent ruling of the Ninth Circuit Court of Appeals approving construction of two dams on the Cowlitz River at Mayfield and Mossyrock. He also said he would ask the state supreme court to rehear a case in which it ruled last month that Tacoma holds a valid license from the Federal Power Commission for the project.

Attorney General Don Eastvold admitted the odds are against the state's winning the legal battle but declared "we have a duty to a lot of people in the state who feel that this is not a legal problem but a problem of protecting the state's resources." Sportsmen contend the Cowlitz River is the state's last good salmon-spawning area.

Meanwhile, Gerrit VanderEnde, chairman of the Tacoma Utilities Board, rapped as "premature" any statement that Tacoma definitely has decided to build the project.

"We will have to re-examine the whole situation before we go ahead," he said. Although the original estimated cost of the dams was $146,000,000, VanderEnde "guesses" they would cost as much as $180,000,000 today. Senator Warren G. Magnuson, in a Tacoma speech, charged that the dams may cost possibly twice as much as originally estimated, because of higher interest rates over a 40-year payoff on the dam bonds.

The Public Utilities Board reprimanded J. Frank Ward, City Light superintendent, for his alleged statement that work on the project could begin within six months unless there are appeals from recent court decisions. VanderEnde emphasized all statements on City Light policy matters, unless made by the utilities director or a board member, are "unauthorized and unofficial."

• **City of Seattle** has begun condemnation proceedings against owners of a 38-acre tract of land in the Duwamish River industrial area upon which it plans eventually to construct a steam power generating plant. The owner of one section of the tract objected to the city council, citing a need for industrial expansion in the area. The council, however, upheld E. R. Hoffman, City Light superintendent, who pointed out that industrial sites would be worthless without power and declared that City Light must develop at least one large new steam plant.

Seattle Plans to Study Pend Oreille Development

Seattle City Light has applied to FPC for permission to investigate construction of a dam 300 ft high near Boundary on the Pend Oreille River. One mile south of the Canadian border, the site is opposed by mining interests, who succeeded in having it dropped from Corps of Engineers' plans in 1947.

In a further move to expand, Superintendent E. R. Hoffman has asked the city council to appropriate $165,000 to complete preparation of plans for adding 125 ft to the height of Ross Dam on the Skagit River. Admittedly expensive, the project would increase head at Ross, Diablo and Gorge plants. Biggest gain would be at Ross, where year-round energy production would be increased nearly 40%.

The project would not be undertaken until cost of power from that source is approximately equal to that from other sources, it was stated.

• **Willamette Iron & Steel** Co. of Portland was apparent low bidder for five schedules of work at The Dalles Dam. Willamette bid $2,335,730 total for the intake gate structures, bulkheads, fish turbine intake gates and appurtenances.

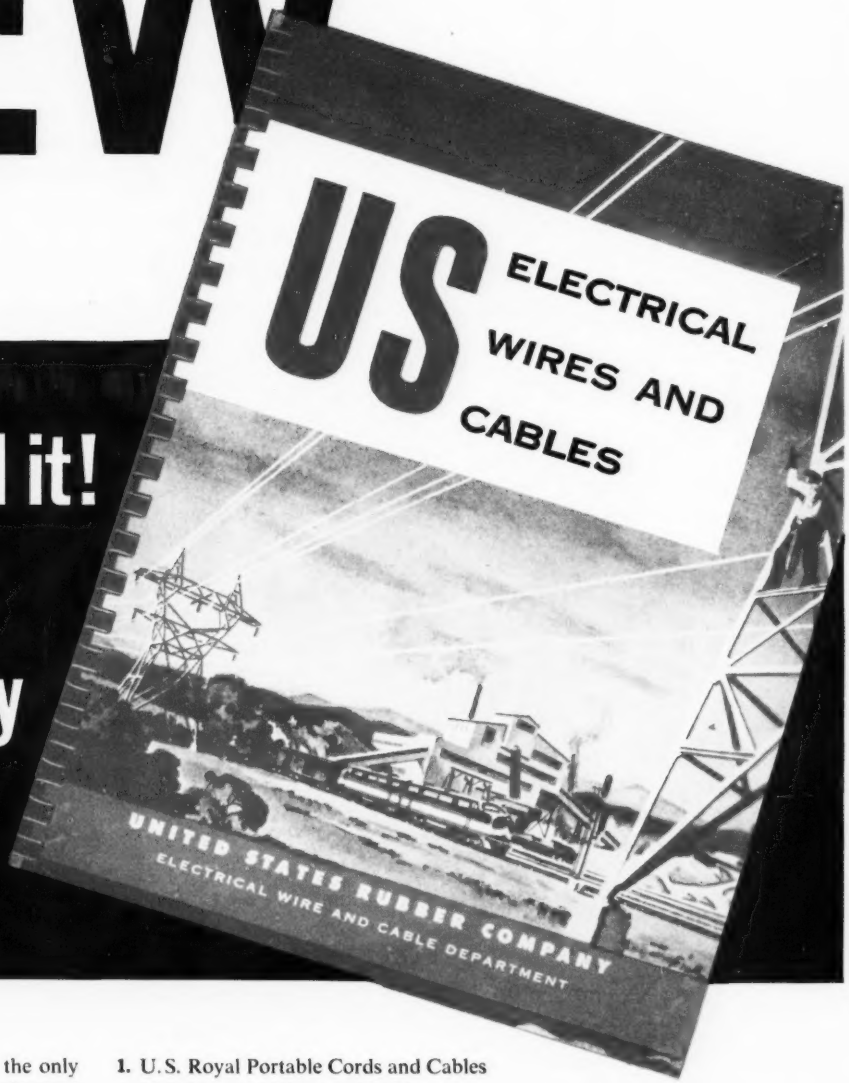
• **Purvis Construction** Co., Spokane, was awarded a $77,135 contract to build a headquarters building for the Ferry County PUD at Republic, Wash.

• **Wasco Electric Cooperative** will build 41 miles of line to service 51 new customers with the major part of a $279,000 loan from REA. The co-op serves 1,500 customers in five north central Oregon counties; has 1,080 miles of line.

• **City commissioners** of Bend voted five to one to permit Pacific Power & Light Co. to go ahead with construction of an intertie between a Bend substation and the Midstate Electric Cooperative system. Work was halted in October by protests of residential property owners.

• **Test runs** on McNary's first 78,000-kw generator began Nov. 5, nearly one month ahead of schedule. Reservoir pool reached a semipermanent level of 335 ft.

NEW



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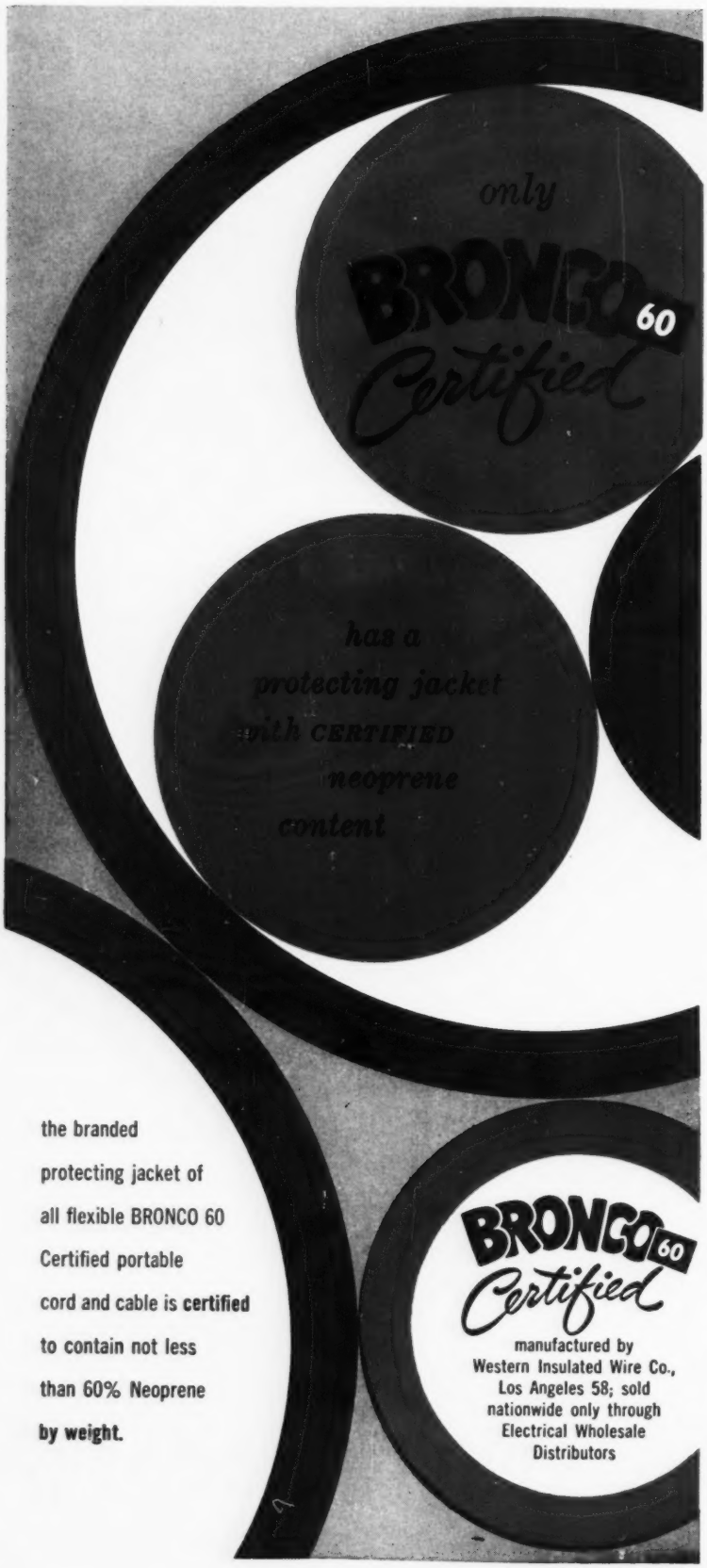


ARIZONA PUBLIC SERVICE WILL BUILD STEAM PLANT

Arizona Public Service Co. will start construction in the spring on a 100,000-kw, $14,000,000 steam electric plant. The new plant will be a separate project from the 200,000-kw Saguaro plant now under construction north of Tucson.

The plant will be placed in operation by the spring of 1956, according to present schedules. Decision to build it was based on findings of a recent five-year forecast of power needs made by the company and estimating load of 502,000 kw by 1957.

Downstream Plants Get Water From Albeni Falls

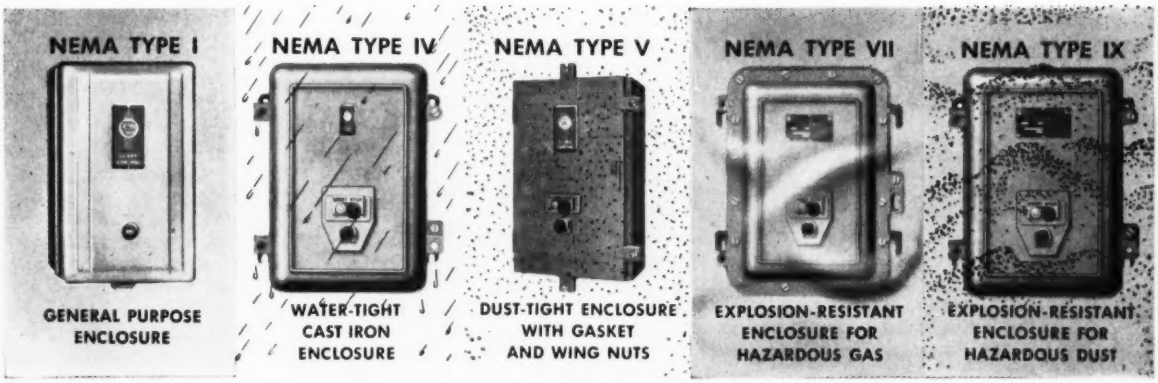
All 10 spillway gates of the Albeni Falls Dam on the Pend Oreille River have been raised, releasing the last of 1,153,000 acre-ft of water for the use of downstream hydroelectric plants on the Columbia River, according to Col. N. A. Mathias, Seattle district engineer of the Corps of Engineers.

The $31,000,000 Albeni Falls project will start producing its own power next fall. In the meantime, its storage is estimated to have a value of $2,000,000 when turned into 500,000,000 kw by the downstream plants.

• **Washington's state civil defense** director called representatives of public and private power in the state to a meeting Dec. 2 at Tacoma to complete plans for utilizing power in the event of an emergency. The meeting was to consider the integration of the communication network of the Northwest Power Pool with the civil defense network, according to Director D. E. Barbey.

• **A study** of the Upper Klamath Basin in Oregon has disclosed a possible plan for development of the power potential of the Klamath River between Keno and Copco Lake, USBR's California Projects office in Sacramento announced recently. The plan, still tentative, would lift river waters 200 ft for conveyance via a multipurpose system through Butte Valley, then tunnel them back to the Klamath River canyon where 1,400 ft of head would be developed by a Shovel Creek power plant.

• **To provide additional storage** for oil used in its F. W. Bird steam plant in Billings, Montana Power Co. is building another storage tank. It will hold the contents of 330 railroad tank cars, nearly four train loads.



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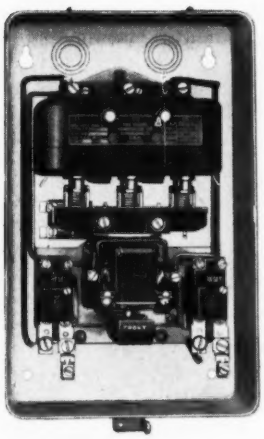

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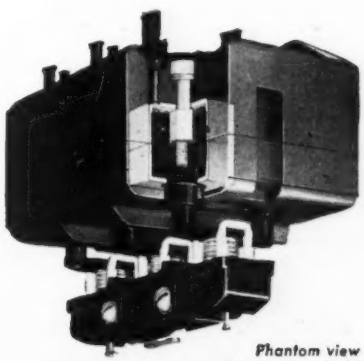

Phantom view showing Arc-shield

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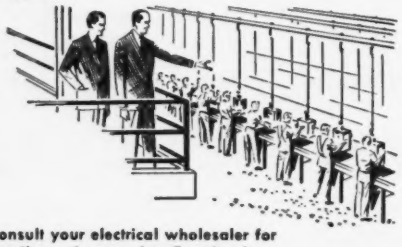

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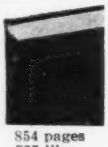

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Those charged with program responsibilities for almost any kind of electrical industry or civic organization have available to them a large reservoir of fine graphic material in the form of motion pictures. Many deal with technical processes or products. Others sell ideas—presented in a form to stimulate interest in electrical applications. These form the basis for highly educational programs.

Many opportunities exist for using such films for spreading electrical know-how, for demonstrating how electrical applications increase productivity, reduce labor, lower manufacturing costs, improve working conditions or make better the standard of living. In this category are the *More Power to America* film series produced by General Electric. Eighteen industrial and community subjects are covered and five films deal with electricity and agriculture. These films are available for industry or civic showing for the asking.

The MPA films cover the following subjects:

Infrared Lamps; Sewage Treatment; Outdoor Recreation; Water Supply; Urban Transit; Laundry Electrification; Electronics Training Course; Resistance Welding; Power Distribution; Oil Field Electrification;

Materials Handling; Electric Arc Welding; Textiles; Industrial Heating; Motor Selection and Application; Progressive Mechanization; Freedom and Power; Atomic Power; Barn Hay Curing; Farm Welding; Farm Water Supply; Electrified Farming; Farm Wiring Program.

Rural Electric Conference Scheduled for February

Latest developments in farm electrification will be presented by a corps of experts at the annual rural electric conference to be held at the University of California College of Agriculture, Davis, Feb. 8 and 9, 1954. The conference is sponsored by the California Committee on the relation of Electricity to Agriculture and is open to farm electrification specialists of power companies, manufacturers and distributors and to farmers.

• **Directors** of the Imperial Irrigation District, El Centro, Calif., have called for bids on $10,000,000 in bonds to build a 33,000-kw hydro plant on the All-American Canal at Pilot Knob. It is hoped that construction bids can be called by February 1954, according to M. I. Mathis, secretary of the district.

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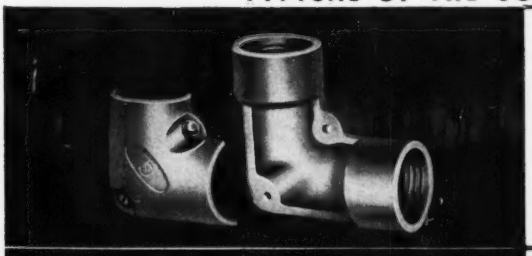

Corner Pull-In Elbows in ½", ¾" and 1" sizes. Ideal for space-saving, machine wiring, easy wire pulling. Cadmium plated.

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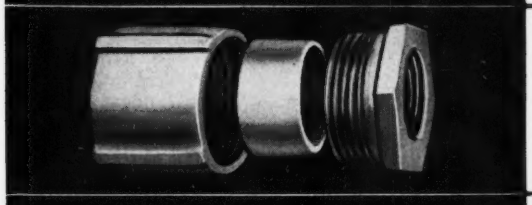

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NEWS ABOUT PEOPLE

• **William E. South,** employed for the past 13 years as a special agent of the Federal Bureau of Investigation, has resigned that position to accept appointment as chief special agent of the Southern California Edison Co. at Los Angeles. His new employment is to fill the vacancy occasioned by the recent death of Matt Hynes, chief special agent for the company for 25 years. South was born at Idaho Falls, Idaho, and moved to the Los Angeles area in 1920. From 1936 to 1940 he was a member of the Los Angeles Police Department. He was appointed a special agent of the FBI in 1940, and has served in that agency at New Haven, Conn., New York City, and since 1943 at the FBI office in Los Angeles.

• **G. S. Perkins** returns to the West to become district manager of the General Electric Co.'s radio and television department, Los Angeles. He was formerly with G-E Supply in Chicago and before that had been with G-E on the West Coast. He had been sales representative for stations KFI and KECA in Los Angeles and following military service was receiver representative for G-E's radio and television department in San Francisco. He replaces **H. G. Randolph,** who was transferred to the company's Houston office as district manager.

• **Bob Ashbrenner,** Bureau of Reclamation electrical engineer, will be superintendent of the power plant at Canyon Ferry Dam when construction of the project is complete and the plant in operation, according to **William P. Price Jr.,** construction engineer. Ashbrenner has worked for the bureau on various power line construction jobs in Montana and first went to Canyon Ferry to supervise construction of a power line from the dam site to the Montana Power distribution system.

• **Thorne L. Mayes,** former works engineer for G-E's Oakland and San Jose operations, has been named general manager of the company's small integral motor department, with headquarters in Fort Wayne, Ind.

• **Garrett Craig,** formerly manager at Brighton for Public Service Co. of Colorado, is now manager of the Sterling office and **Jim Hart,** power sales, Denver, takes his place at Brighton.

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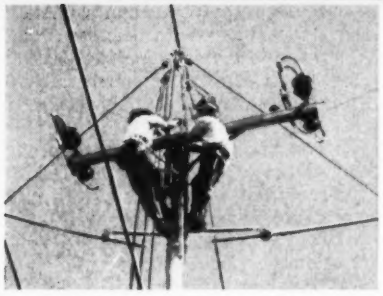
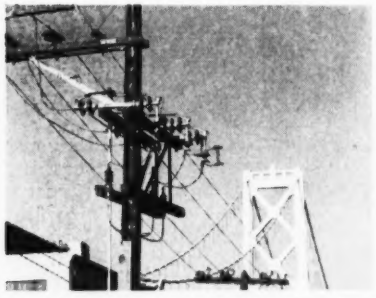
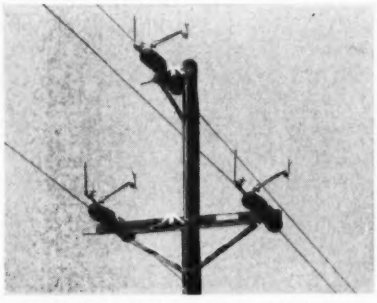


Installing KPF Type A-202 switch hot on 12 kv line. KPF phase units are shipped completely assembled, ready for quick installation.

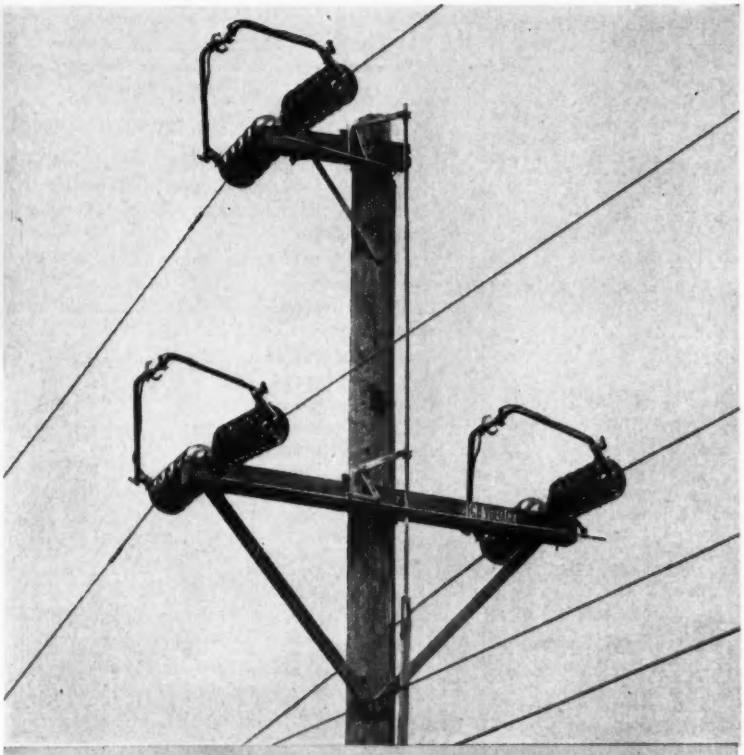


Horizontal-mounted KPF Type UF-2 switch in metropolitan service (P.G.&E., San Francisco). Versatile KPF switches operate equally well with or without line tension.



KPF Type S-205 switches with inexpensive Quick-Break attachment on 60 kv rural transmission line. Switch shown in open position.

2825



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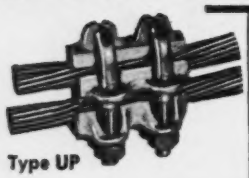
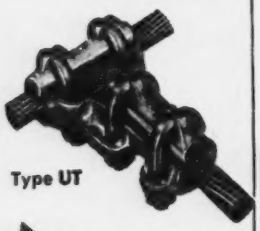
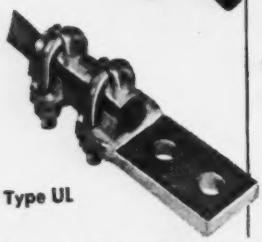
DOSSERT the U-Bolt Connector

with special engineered features for use with copper, aluminum, copper to aluminum


Type UP

Type UK


Type UT


Type UL

Selecting the ideal connector for your purpose is made simpler by this complete Dossert U-bolt connector line. In each one you will find these Dossert features —

Variability to accommodate a wide range of cable sizes

High Clamping Action made possible by special design

Cable End Relief to allow for distortion of cable ends

Conductivity by use of high copper alloy to assure cooler-than-conductor operation

Write Dept. A for descriptive literature.

Type US

Type UPT

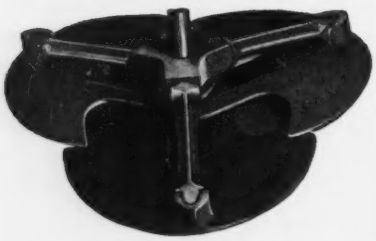
Type UPK

IMMEDIATE DELIVERY

DOSSERT MFG. CORP.
249-255 HURON STREET, BROOKLYN, N. Y.
SINCE 1904

Representative—George S. Koch Associates, 420 Market St., San Francisco

EXTRA Holding Power QUICKLY Installed TOUGH For long life



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For new construction and maintenance —Everstick Anchors speed up work and provide dependable anchorage on all types of jobs. Made of resilient, rust resistant malleable iron. The toughest anchors made. Write for bulletin.

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It follows the sun . . .

TORK ASTRONOMICAL CONTROL
DIAL now is ready, as a kit, to fit any regular model on the job Simple to change. Saves time — Saves money **Use the best.**
PLAY SAFE

ON AT SUNSET —
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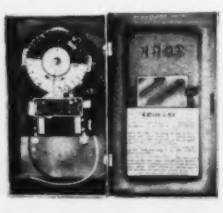
Tork Time Switches require no attention — this feature $12.00 A must on all public safety lighting. An economy on all commercial lighting. **Tork** is fully automatic. No one forgets.



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• **Dr. Lester M. Field** of Stanford University has been appointed professor of electrical engineering at the California Institute of Technology, where he has been a visiting professor since last January. At Cal Tech he has set up an electron tube and microwave laboratory, with support from private industry and the Office of Naval Research, and is continuing his research on microwave amplification and interaction processes.

• **Joseph M. Morgan** has been transferred by the Bureau of Reclamation from his former position as Alaska district manager to a new assignment with the bureau's office in Washington, D. C. He has been succeeded at Juneau by **R. W. Jennings,** formerly area engineer at Grand Junction, Colo. The bureau's most important project in Alaska currently is the Eklutna hydroelectric development, now under construction near Anchorage.

• **Alden F. Krieg,** lighting engineer for Portland General Electric Co., has been appointed to Portland City Planning Commission by Mayor Fred L. Peterson. President of Portland Junior Chamber of Commerce in 1952 and a director of the senior chamber, Krieg has been a member of the governor's committee on home safety and of the school lighting committee of the Oregon section, Illuminating Engineering Society.

• **Walter S. Gordon,** consulting engineer of Tacoma, Wash., has been named chairman of the recently created Washington State Power Commission. **Roy Skill** of Yakima was chosen vice-chairman and **Tom Quast** of Marysville secretary.

• **Robert Haselwood** has accepted a position as city engineer at Anchorage, Alaska, where he will be responsible for supervision of the city-owned public utilities system as well as regular engineering duties. He was formerly city engineer at Tulelake, Calif.

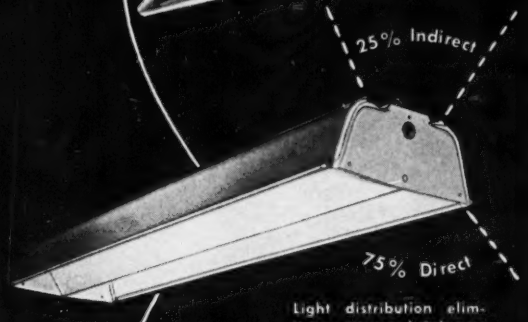
Deaths

• **Edwin M. Enright,** 49, Denver electrical engineer, died Oct. 29 in Mishawaka, Ind. He was associated with the Stearns-Roger Mfg. Co. in Denver. Born in Indiana, he was a graduate of Purdue University.

• **H. C. Burrell,** 50, of San Francisco, geologist and manager of raw materials development for U. S. Steel's Columbia-Geneva Steel Division, died Nov. 9 while on business in Pittsburgh. He was stricken in the U. S. Steel office and died a short time later at a Pittsburgh hospital.

the new CURTIS *industrial*

Side Reflectors hinge downward and may be completely removed for ease of maintenance.



Light distribution eliminates severe brightness contrast and tunnel lighting conditions.

Louvers available where greater lengthwise shielding is desired.

Curtis "Tong Hangers*" facilitate and cut installation cost as they allow flexibility in placement of hangers and permit by-passing of building construction obstacles such as beams, sprinkler heads, etc.

*Pat. applied for.

6000 *Series*

The New Curtis "Six Thousand" series is designed for Eye-Comfort® in industrial locations. The Luminaires illuminate the ceiling with an indirect component of 25% of the light output. Crosswise shielding of 35° is provided for the 75% direct component. The lighting units in this versatile line are available with Alzak Aluminum, Porcelain Enamel, or baked white "Fluracite" enameled steel removable side reflectors. Low cost efficient maintenance is provided by having side panels readily removable for cleaning. In addition there are no horizontal diffusing or reflecting surfaces to collect dust. There is a unit in this versatile line to accommodate all 4', 5' and 8' fluorescent lamps. The Curtis "Six-Thousand" series brings Appropriate Brightness Control Lighting to industrial areas. Mail coupon for FREE descriptive literature.

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Chicago 38, Illinois

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Company_____

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NOTES ON THE TRADE

Official Discusses Benefit Program

General Electric Co. during 1952 spent about one-sixth of its pay roll in the three Western states—nearly $10,000,000—for its employee benefit program in those states, Allen D. Marshall, manager of the G-E employee benefits department, New York, told news men in San Francisco last month. He was in the West to see how the G-E program is working in this area and, as a director of the U. S. Chamber of Commerce, to discuss with businessmen the chamber's proposal for federal old age benefits.

Philosophy back of the G-E program is to help employees help themselves. Benefit programs are tailored to fit the average man, not the individual, he pointed out. But G-E believes that they help employees understand the need for insurance and savings plans and it keeps its own program as small as possible in order to leave the individual enough money to buy protection for his particular needs.

Marshall was accompanied by R. C. Reed, manager of G-E benefit procedure, Lisle L. Berkshire, manager, Western division, Chamber of Commerce of the United States, William J. Baroody, secretary, committee of social legislation, U. S. Chamber.

• **Kortick Mfg. Co.**, maker of pole line hardware, has moved to a new plant at 5600 Third St., San Francisco. Its former address was 345 First St.

• **Thermador's Electronics** Division is now operating in its new Los Angeles plant. Transfer of tooling and assembly lines for transformer production from the Thermador location and of the motor production lines from the Alhambra plant has put the manufacturer's electronics production under one roof. The new plant occupies 77,000 sq ft.

• **Appleton Electric Co.** of Chicago has leased warehouse space at 1216 Sixth Ave. S. in Seattle. The Seattle area had been served from the manufacturer's San Francisco warehouse.

• **The Hank Thurstin Co.**, 980 Forest St., Denver, Colo., has been appointed representative for Copes-Vulcan products.

NEW PLANT of BullDog Electric Products of Los Angeles has 22,000 sq ft of floor space and will be used for warehousing and manufacturing of distribution equipment. The Los Angeles company acts as factory representative for BullDog and plans also to fabricate and assemble electrical products to meet the requirements of the local area

• **Pyle-National Co.** of Chicago has appointed George E. Mead Co. as representative for its industrial Multi-Vent line in a section of Washington including Whatcom, Skagit, Snohomish, King, Pierce and Skamania Counties.

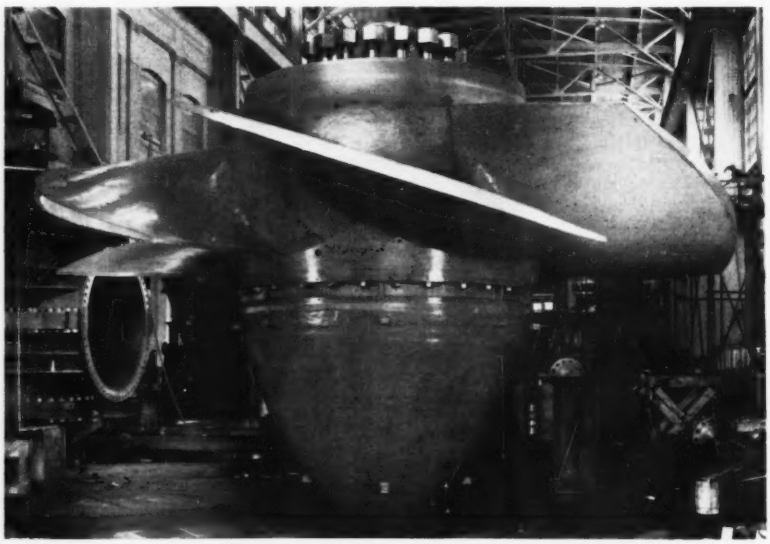
• **J. Donald Akers,** former district manager for American Electric Co. in Colorado, New Mexico and Wyoming, has been appointed district manager, Detroit city sales office, by BullDog Electric Products Co.

• **Burndy Engineering Co.** is sending its fifth display truck on a nation-wide tour to show the manufacturer's line of connectors and installation tooling.

• **Bill Harrison** of Sues, Young & Brown, Los Angeles, was among distributors attending the Vornado sales meeting held by O. A. Sutton Corp. in Wichita, Kan., recently.

• **R. B. MacDonald,** vice-president and manager, Joslyn Pacific Co., Los Angeles, was elected a vice-president of the parent company at a recent meeting of the board of directors in Chicago.

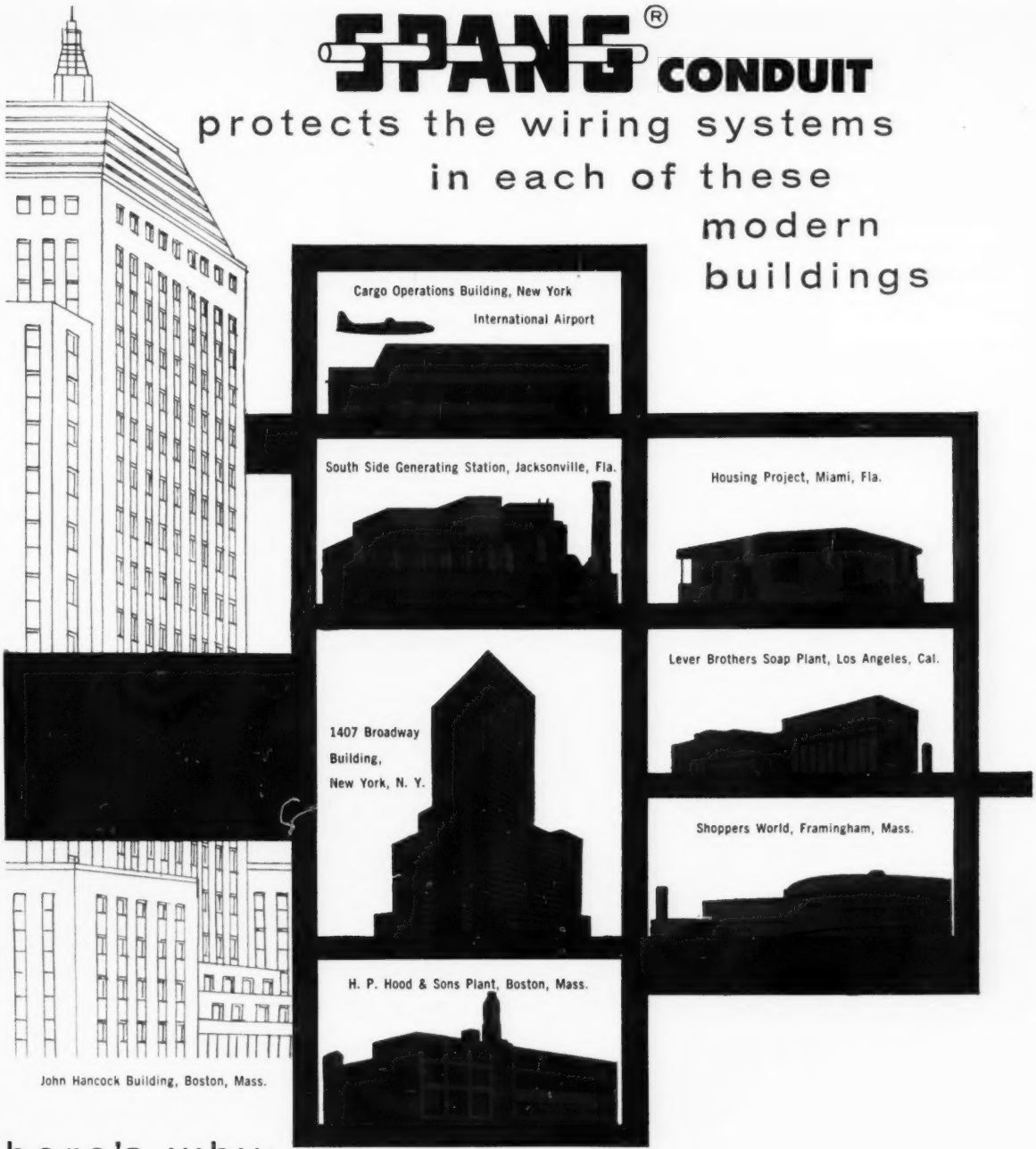
• **Miller-Robinson Co.**, 7007 Avalon Blvd., Los Angeles, has been made West Coast distributor for the Hydro Sky-Worker, boom for transporting men and equipment. West Coast sales will be handled by **Robert D. Bennett,** assisted by **Bernard Scheuer.**



SHOP VIEW of the runner and hub of one of 14 turbines for McNary Dam being manufactured by S. Morgan Smith Co. This Smith-Kaplan turbine has six blades, each one weighing 30,000 lb and measuring 12 in. thick at the heaviest portion. Each turbine unit has 111,300 hp and travels at 85.7 rpm under an 80-ft head. This is roughly equivalent to a speed of 75 miles per hour at the outer tips. One complete turbine unit weighs 2,000,000 lb. The 14 units will have a total generating capacity of 980,000 kw

SPANG® CONDUIT

protects the wiring systems in each of these modern buildings


Cargo Operations Building, New York International Airport
South Side Generating Station, Jacksonville, Fla.
Housing Project, Miami, Fla.
1407 Broadway Building, New York, N. Y.
Lever Brothers Soap Plant, Los Angeles, Cal.
Shoppers World, Framingham, Mass.
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John Hancock Building, Boston, Mass.

here's why:

Spang Conduit is the combination of top-grade steel and quality-controlled manufacturing which gives you conduit to fit any wiring needs.

Evidence of the wide demand for Spang Conduit can be found in the many types of buildings for which Spang exclusively has been specified. Whether it's an airport, a manufacturing plant, a power plant, an office building, a home . . . no matter what the type of building . . . architects and contractors find that Spang offers the conduit best suited for their needs.

Spang is easier to cut, thread, bend and weld, saving valuable time and money on conduit installation. Take your choice of any of the "big four" in a full range of sizes. Spang offers you Cenlaco, Central Black, Central White, and EMT with the SPANGLEAM Finish.

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GENERAL SALES OFFICE:
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District Offices and Sales Representatives in Principal Cities

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PROFILES

Trudy Winter, left, has bequeathed her 700 bosses to the new executive secretary of the Electric Club of Los Angeles, Marion Bacot, right, and will devote full time to the job of homemaking. Last month Electric Club members gave Mrs. Winter a $100 bond

Harold G. Rethmeyer, former San Francisco branch manager for Westinghouse Electric, is one of three men promoted when the company designated three branch areas as district headquarters. Rethmeyer is now Central Pacific district manager

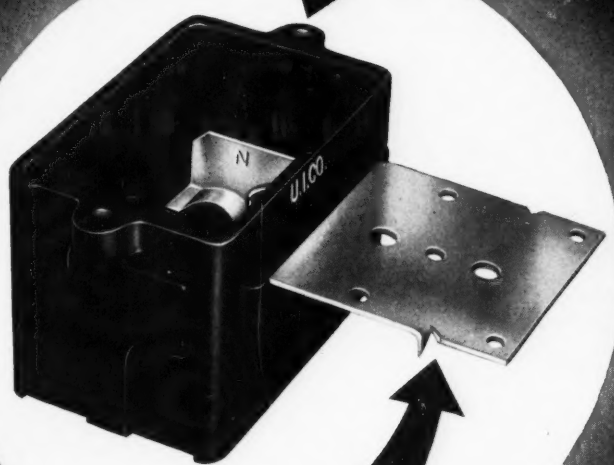
Rethmeyer

Cheyenne contractors have among them the District 8 vice-president, Charlie Simpson, seated at right. Standing are F. W. Fitch, Joe Simpson, O. N. Buckles and Bob Moeller. Seated are Al Sandahl, Norman Cable and the NECA vp Simpson. All are active in the doings of the Rocky Mountain Chapter whose area covers the state of Wyoming and Colorado, from Denver

YOU CAN'T MISS

with UNION'S 9000-F BOX

"PLASTER-SEAL"
Keeps Plaster from Device Screw Holes. Thin Molded Flash is Easily Removed with Screw Driver: Reduces Wet Wall Finishing-out Cost



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Front Mounting Bracket Instantly Locates Box for Depth With Convenient Front of Stud Nailing

See Our Display at the N. E. C. Convention

WRITE FOR FREE SAMPLES

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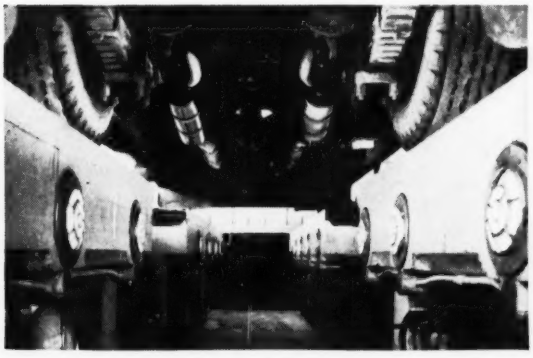
AIR BREAK DISCONNECTING SWITCH
115,000 volts—1200 amperes
Type 0-2
Underhung mounting. Three-pole, single throw.
Group operated. One pole shown.
Silver to silver contacts.

Bending light rays to your task

Applying the principles of refraction, lighting engineers can change the direction of light rays by "bending" them through a lens. Controlled light can increase visibility and reduce glare . . . boost productivity as much as 15%. P. G. and E.'s free consulting service will show you how.



Controlled light at work. Explosion-proof fixtures in the greasing pits of the San Francisco Municipal Railway's Kirtland Bus Terminal bend light up to the undersurface of the buses for inspection and maintenance. Recessed within the walls, they leave plenty of working space in the pit. Engineered lighting like this pays off quickly in efficient plant operation.

Comfortable lighting for the modern executive office can be obtained by careful design and orientation of luminaires. This layout of low brightness lens units eliminates shadows and reflected glare from the desk of Mr. Charles Goodwin, Manager of General Electric Supply Company, San Francisco. Visual comfort is a vital factor in every type of office work.

For free planned lighting advice, call your nearest P. G. and E. office today.

P·G·and E·

PACIFIC GAS AND ELECTRIC COMPANY

12X-53

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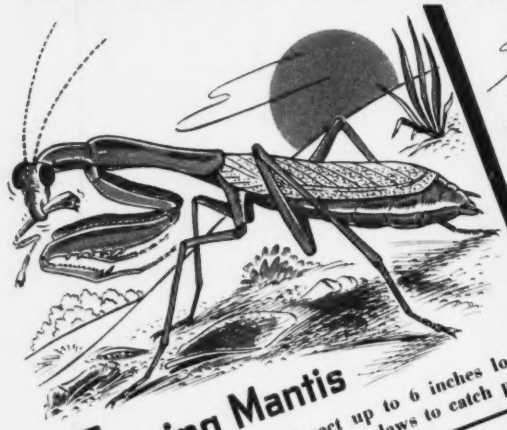


Praying Mantis

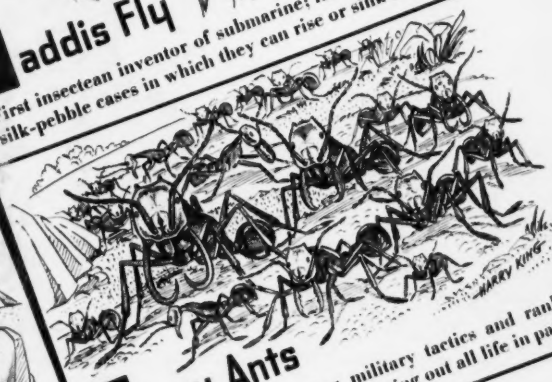
A meat-eating, tropical insect up to 6 inches long; raised commercially; uses front claws to catch prey.

Caddis Fly

First insectean inventor of submarine; its larvae build silk-pebble cases in which they can rise or sink at will.

Egyptian Scarab

Considered sacred by ancient Egyptians who thought its habit of rolling balls of dirt had to do with planets.



Army Ants

Blind, tropical ants using military tactics and rank; march in long wide columns wiping out all life in path.

....these uncommon insects by any other names would still be uncommon!

P.C.E.A. by any other name would still be uncommon, too. And there are many good reasons why. Take membership, for example. We're one trade association whose membership roster keeps on growing year after year—even after 36 years. Since the end of World War II we've doubled in size, with half the increase coming in the last two and a half years.

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If you would like to take an active part in the work of our uncommon organization, contact either one of our offices for full information.

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